The Builder.

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ILLUSTRATIONS.

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Chester Cathedral, and its Restoration.

CHESTER CATHEDRAL had fallen into a state of dangerous disrepair. We can remember gazing with wonder and regret, twenty years ago, on its honeycombed walls, its absent mouldings, and tottering buttresses. In 1868, the energetic Dean of Chester, Dr. Howson, announced the intention of the chapter to proceed in the work of restoration without delay, under the direction of Mr., now Sir, Gilbert Scott, and invited help from the country at large. From that time to this the works have been carried on steadily at a cost of over 70,000*l.*, and by the time that these lines reach our readers, the completed building will have been publicly opened for service.

Soon after the commencement of the works, 1870, Sir Gilbert Scott read a paper before the Architectural and Archæological Society of Chester on the architectural history of the cathedral, part of which we venture to condense as an introduction to the view we give of the organ and gallery now in the north transept* :—

Unlike the majority of great Mediæval churches, its origin and the date of its foundation are unknown. Chester having been a Roman city, it follows that it must, during the last century of the Roman occupation,—when the empire was Christian,—have possessed churches, and one may have stood upon this site. The same may be said of the interval between the departure of the Roman legions and the Anglo-Saxon conquest; a period prolonged in this instance through the district which includes Chester having been held much longer by the Britons than most parts of England. They were Christians, and must have had churches, and one may have stood here. Whenever founded, the original church is said to have been dedicated to St. Peter and St. Paul; and Mr. Parker conjectures it to have been Romano-British. During the Anglo-Saxon period, however, the dedication of the church was changed from St. Peter and St. Paul to St. Werburga and St. Oswald. This was, at least, as early as the reign of Athelstan, as he and several later kings are recorded as having paid their devotions at St. Werburga's Church, and probably about the year 908, during the time of Ethelred, Duke of Mercia, whose wife, Elfleda, was the daughter of the great King Alfred, and resembled him both in piety and valour.

A century and a half later we find the church to have become ruined, probably during the second great Danish invasion, and restored or rebuilt during the reign of King Edward the Confessor, by Leofric, the wise and great Earl of Mercia, and his pious Countess Godwina or Godiva, of famous memory. The restored English rule thus again did homage to the memory of their royal saints; nor, when our country fell once more under foreign dominion, was their memory dishonoured, for the first Norman earl, Hugh Lupus, sister's son to the Conqueror, and his Countess Ermentrude, refounded the church on a far greater scale, converting it from a church of secular canons (just such a collegiate body as now exists) into a Benedictine monastery; and that, not at the instigation of the English alone, but of the great foreign ecclesiastic, St. Anselm, then Abbot of Bec, but soon to become Archbishop of Canterbury.

Not only was it customary with the Normans, while dealing with the ecclesiastical structures of their predecessors, to make a clean sweep and reconstruct them on a greatly enlarged scale, but the change from a comparatively small collegiate institution to a great monastery of necessity involved this. It is, therefore, not to be wondered at that no vestige of the older buildings remains. Our architectural investigation must consequently commence with the new foundation, begun by Hugh Lupus about 1195. The previous church, if only a restoration of the older Saxon edifice, was probably of no great dimensions; though, if it was actually rebuilt by Leofric, it would be contemporary with the Confessor's work at Westminster, and might therefore have been of large size. We have, too, a work remaining, partly erected by Leofric, at Stow, in Lincolnshire, which might afford some suggestion as to the probable scale on which he would have been likely to build; but all such speculations are useless. Of the Norman structure, however, we have enough remaining to give a very fair idea of its dimensions and arrangement. The parts of it existing above-ground consist of the lower portions of the north transept, of the wall of the north aisle of the nave, and of the north-western tower. The plan, which may be in a great measure deduced from existing evidences, is not unlike that of some others of the churches built by the early Normans in England. It may, perhaps, be specially likened to that erected by Lanfranc at Canterbury, itself an almost exact copy of St. Stephen's at Caen, founded by the Conqueror, and over which Lanfranc had presided. Possibly this, in its turn, may have been imitated from the great abbey of Bec, in Normandy; and, if so, it was natural that this church, refounded under the influence of Anselm, and his nominee, Richard, the first abbot, himself a monk of Bec, should also bear some resemblance to it. Its characteristics are a nave of moderate length, whose aisles were terminated westward by towers, and unaisled transepts of only two bays in length, from which, on their eastern side, projected chapels of, probably, an apsidal form. There was, of course, a central tower, beneath which, and extending probably one bay into the nave, were ranged the stalls of the choir. The eastern arm, as at Canterbury and at Caen, was aisled, was small in length, and apsidal in its eastern termination. Here, however, the resemblance would seem to have ceased, for, though the older eastern ends have been removed both at Canterbury and at Caen, it is not generally supposed that the aisle passed continuously round their apses, or that they possessed radiating chapels, both of which are seen to have existed at Chester. For the types, then, of our eastern end we must look elsewhere. At Gloucester, Tewkesbury, Chichester, Leominster, Norwich, and in many other Early Norman churches, we have the aisle continuing round the apses, round which the arcade and its range of columns is also continuous; and from the aisles radiate the chapels to the east, north-east, and south-east. In all these cases, however, the chapels projected boldly from the aisle, while at Chester there seems to have been a unique modification of this arrangement, the side chapels not projecting directly from the aisle, but being partly cut out of its width in a very curious manner.

It would not appear that the entire church was completed at a single movement. As was usually the case, it is probable that the parts first needed were earliest built. These parts would be the eastern arm, the central tower (as high, at least, as its interior formed a part of the church), and probably one bay of the nave. This would give the choir and the chapels—in fact, the parts absolutely requisite to divine service. Accordingly, we find in the transept the earliest (English) type of Norman, while in the western tower we find the style in a more advanced form. This feature, so far as it exists, is particularly fine. Its date is conceived by Sir Gilbert Scott to be about 1120. In a line with it, and bounding the western side of the cloister, is a very fine structure of considerable size, vaulted throughout upon a central range of Norman pillars. This formed the substructure of the abbot's hall, and was probably of the same date with the tower, though the narrow chamber between them, forming the passage from the abbot's lodging to the cloister and supporting the abbot's private chapel above, is later; in a style, probably, as late as quite the middle of the twelfth century. These substructures are found in all early works of a semi-domestic character. It was the custom of the period for persons of rank to have their living-rooms well raised above the ground. We accordingly find almost every important room in dignified residences of these early periods placed on an upper floor, and vaulted substructures placed beneath them, which were used for stores, cellars, and for other less important purposes. Even private chapels were often similarly raised for the convenience of being on a level with the living-rooms. It is so with th

* See pp. 760, 761.

Abbot's Chapel just mentioned, and this is the reason why St. Stephen's Chapel at Westminster, and the Sainte Chapelle at Paris (both the private chapels of the palaces), were erected over crypts. We see the same in the Prior's Chapel at Ely, in the chapel at Ely-place, London, in the chapel of the Tower of London, and in many other instances.

We know nothing of the history of the fabric for a considerable time after the erection of the Norman church. All we read is of the places where the abbots were interred; and six of these are still marked by arched recesses in the northern wall of the nave, facing the cloisters. These are of different periods during the twelfth century. Towards the end of this century, that is to say about 1105, the eastern parts of the church appear (from some malconstruction probably) to have become dilapidated and to have threatened actual ruin. It seems to be said that the choir had been rebuilt from its foundation by about 1205; but as the Norman foundations of both the outer wall and the columns of the eastern arm still exist, this expression must either have been an exaggerated one, or the use of the term "choir" must have been limited to the central crossing where the actual choir—that is, the monks' stalls—were placed. Probably, however, there was some considerable reconstruction of the eastern part, though not literally from the foundation.

From the lugubrious tone in which the monks make petitions for pecuniary aid, and the exaggerated style in which they describe the ruin of the church and their own poverty, Geoffrey the Abbot must have been much like his contemporary at St. Alban's, John De Cella, whose high artistic aspirations, united with unbusiness-like habits, are so humorously described by Matthew Paris. Geoffrey describes the choir of his church as "intolerably threatened with ruin, and threatening with danger of death those who assisted at the divine offices." He boasts of having rebuilt it at great cost from the foundations, yet we find within a century all had been rebuilt again, and not a vestige excepting one small chapel left of his work. We find that in 1211 the choir and tower of Chester were finished. The relics we possess of his work are scanty in the extreme, but, like those of his contemporary at St. Alban's, they are of a very high merit. About 1240, the number of the monks was increased, which probably led to the rebuilding of the chapter-house; and in the time of Edward I., or somewhat earlier, they again undertook what was called at the time "the great work of rebuilding the church," for the choir also must have been found too small. In 1259, the monks met to consider the rebuilding, though only fifty years since it had been before rebuilt. In 1281, they came into possession of considerable property. In 1284, the king made a grant of venison from his forests at Delamere and Wirral; and a memorandum in the margin of the grant says that it "was for the monks engaged in the great work of rebuilding their church."

The very important works of which we possess this scanty information were carried on during the abbacy of Simon de Albo Monasterio, or Whitchurch—a prelate apparently of great ability, who ruled the monastery from 1265 to 1289. He freed the abbey from sundry lawsuits, obtaining decisions very much to their advantage, and it is clear that he must have at least commenced the reconstruction of the entire eastern arm of the church, including the lady chapel.

It is evident that the older parts (to say the least) of the choir were not at first carried up beyond the level of the triforium; for whatever may be the difference of age in the arcades below, the clearstory is throughout of later style. The style of the clearstory is rather advanced, though still not late, Decorated. The choir was, like most parts of the church, designed for vaulting, but never completed, the present groining being of lath and plaster.

The next great work undertaken was the reconstruction, on a most extraordinary scale, of the south transept; and simultaneously (as is supposed) with it, of the south aisle of the nave. This transept and the nave were prepared both for vaulting and for flying buttresses, but neither was carried into execution. Mr. Parker is probably correct in assigning this work, with the commencement of the reconstruction of the nave, to Abbot Richard Synesbury, who held the abbacy from 1349 to 1363, and was deposed for wasting the goods of the monastery. Perhaps the erection of this vast transept for the parishioners of St. Oswald may have been a part of this alleged waste, and truly it must have been a costly work. Its character is of the latest variety of the Middle Pointed or Decorated style, and it is an excellent work of its period. The shattered fragments of the southern ends of its aisles are as fine as any work we possess in this style. The nave and transept are said to have been finished by Abbot Simon Ripley, between 1485 and 1492, who is also said to have erected the northern arcade of the nave in imitation of the southern one of a century and more earlier date.

The windows of the west aisle of the transept and the south aisle of the nave, though of the Decorated period, did not receive their tracery until after the establishment of the succeeding style. The latter have, however, within the last few years, been renewed in the earlier style. The earlier documents frequently speak of the "Campanile," which Sir Gilbert imagines to have been the south-western tower. This was taken down by Abbot Birkenshaw, and the foundation of a new tower laid in 1508, when a new west front was also commenced. He only succeeded, however, in carrying up his tower to one stage of its intended height, and with this work, including the west end and the south front, closed the Mediæval building of St. Werburg's Abbey Church. The great central tower has been already rebuilt, though at what period is uncertain. It is attributed to Abbot Ripley. It is a very fine structure, and was prepared for a lofty spire, which would have added greatly to the dignity of the church.

The decay of the external stonework throughout the cathedral was most lamentable. In many parts, in fact, it was impossible to retain any portion of the old stones, so that restoration meant renewal. Such has been the case with the eastern clearstory, with almost the whole of the Lady Chapel, and with the central tower. The decay had gone deep into the stone and left its courses projecting, rounded and shapeless, like the layers of a mouldering rock; so that it was only by accident, here a little and there a little, that it was possible to trace out the ancient design, which has been further hidden by many barbarous reparations.

The late Dean, not contemplating the general restoration that has since been undertaken, wished to enlarge the choir, and he brought out the stalls to the east side of the crossing. Over was the organ, and the side arches were filled up with glass, to prevent draughts. But it did not do so, and the draughts were very inconvenient. Early in the restoration it was determined to take down all this glass, and open the view from end to end; and it was resolved to bring the stalls back to the east from the west side of the crossing. As to the organ, it was now seen that it would not do to put it up again where it had been, and they decided to place it between the two piers of the great arch of the north transept, and an organ-screen, the gift of the Duke of Westminster, has been constructed. The organ is practically available for the choir and the nave, and there is an uninterrupted view through the building from west to east. At the same time they did not desire to cut away the return-stalls, but they opened the panels behind them, so that they could see through up to the lady chapel. We reserve our own opinion as to the position of the organ.

At the eastern end of the choir there is a mosaic of the Last Supper, executed by Messrs. Salviati, after a design by Messrs. Clayton & Bell, who have also decorated, with their usual skill, the choir roof, in which the four greater and twelve lesser Prophets are shown in the two eastern bays, while angels, with musical instruments, are in the western bays of the roof, immediately over the choir-seats. Wood from Palestine has been employed both in the retable which frames the mosaic and in the holy table itself, on which the chief plants connected with our Lord's Passion have been carved by Mr. G. F. Armitage, of Altrincham, after a plan suggested by the Dean. On the broad western step is a representation of the Passover in incised marble. On the open space of the floor below this step are heads of the Apostles, round the lectern, and in the corners heads of two doctors of the Western and two doctors of the Eastern Church,—Ambrose, as representing Church Music; Augustine, Theology; Athanasius, the Creeds; and Chrysostom, Preaching. The tile-work has been furnished by Messrs. Craven, Dunnill, & Co. The bishop's throne and the pulpit (on which are carved the building of the Hebrew temple, the preaching of St. John the Baptist, and the vision of the Heavenly Jerusalem) are the work of Messrs. Farmer & Brindley. The sedilia have been restored by Mr. Thompson, of Peterborough, who (besides all the works completed some time ago in the nave) has also executed the reparation of the stall-work, the structure of the choir roof, and the pavement under the tower. The organ (provided with all modern improvements) has been enlarged and rebuilt by Messrs. Whitely, of Chester, the organ-case being the work of Messrs. Farmer & Brindley.

The restoration of the sedilia (a work of great archæological interest) has been effected at the cost of the Freemasons of the western division of Lancashire, and the structure of the choir roof at the cost of Mr. Platt. The stalls have been contributed by separate donors.

Amongst the decorations of the cathedral must be mentioned some stained-glass windows, which are placed at the extremity of the south aisle of the choir, in memory of the late Mr. Brassey; the large window at the east end of the chapter-house, by Messrs. Heaton & Butler, representing historical events and historical persons connected with St. Werburg's Abbey and the cathedral church, and placed in memory of the late Dean Anson; and also windows in the lady-chapel, representing thirty scenes from the life of St. Paul.

Painted glass for the large window in the north transept is to be given by friends in the United States, the subjects selected being the Seven Deacons and the Seven Churches of Asia.

On the north of the church, in contiguity with the east walk of the cloister, a great improvement is in progress, by the clearing out, repairing, and bringing again into use, of a vaulted chamber, which has long been choked with rubbish and concealed in the dark. This change will supply a much-needed vestry.

We must not close this notice, brief and imperfect though it be, without a regretful allusion to the recent death of Mr. Frater, the clerk of the works. For critical remarks on the work done, another opportunity will present itself. We shall in an early number give views of the pulpit and episcopal throne.

STUCCO.

We have it on very good authority that the British public in one of its periodical fits of morality is a ridiculous spectacle. That small portion of it which sacrifices at the shrine of Culture, as the priests of that goddess have depicted her,—that small portion which settles the fashion in things artistic,—betrays perhaps the biggest indignation in its chronic stand against the untruthfulness of much that contributes to mundane happiness, and springs from mundane success. The man who whitewashed the painted walls of too many a church and cathedral while the plague was playing high jinks in the metropolis, has probably had an opportunity of explaining to his companions in Hades how he did it with the best intentions, and the reports of the most recent *convoi* of churchwardens have probably confirmed him in the ignorant assumption that what he attempted for sanitary reasons has been since successfully accomplished for artistic ones. But, happily, that man, as far as British humanity goes, is as extinct as the dodo, and as little likely to reappear by any sort of reversion as that remote ancestor from whom he and his posterity are said to be descended. The small portion of the community to whom the country is indebted for a just appreciation of æsthetic sensation not only stands in his way, but guards every approach to the maze of modern architecture—to the centre of which no key but Truth is now enabled to penetrate. For of what value is an æsthetic sensation if it be not thoroughly genuine? A Pilate might ask jestingly—What is Truth? and be careless of the answer; but more modern judges live in such an atmosphere of artificiality that they are bound not only to put the question with the strictest sobriety, but also to answer it themselves according to the sternest definition. It is quite useless to urge upon them the dictum of a great French exponent of imitation in the fine arts—quite superfluous to urge with him that, in every art there must be some fiction with respect to truth and something incomplete with respect to resemblance. They take the letter of the law, which they translate in accordance with the terms of a particular vocabulary—all other translators and vocabularies being hopelessly at fault. Although for long years the world has been led to believe that the art of con-

cealing art was approved by gods and men, the cultivated Mrs. Grundy (the goddess Ydgrun of Erewhon) objects to any sort of concealment whatsoever. She has not only fished up from the bottom of a well, Truth, that had modestly sought refuge there, but persists in exposing the unsophisticated fugitive to the public gaze; and were the latter ungenerous enough to retaliate, there would soon be an end of the "vain opinions, flattering hopes, false valuations, imaginations as one would and the like," without which, as Bacon said, the minds of men would be "poor shrunken things"; and an end too of all further possibility of making up that "bundle of inconsistencies and contradictions" which, according to Swift, help to compose the life of man from youth to old age. Mrs. Grundy, with Truth in leading-strings, would make the Lares and Penates of modern communities almost Japanese in unadorned starkness; and in denouncing the works of the Evil One she has included stucco amongst them. She has not only prayed to be kept honest, but, moreover, to be surrounded during her lifetime with honest brickwork, and her prayer has been heard. The bricklayer, the carpenter, the joiner, in churches, schools, and houses, have since bared their bosoms to the multitude. The sculptor has discarded finish or refinement in order to show mankind that he has been working with a tool; the painter has so dispersed his groups as to allow spectators the gratification of seeing between them the kind of material upon which they are depicted. Oak has been gilded on condition that the grain of the wood could work itself through; or it has been painted whenever the ingredient which renders paint durable and efficacious could be omitted. The pursuit of purity has extended to the head of a nail, the cut of a screw, the adornment of a nut. The rivets of an iron plate were never so hidden or so loftily placed but the architectural purist has displayed for them his loving care; and at the close, when new stone, new brick, and new wood appeared unblushing and innocent, the happy architect has turned round to receive the applause of Mrs. Grundy and her troop of followers; and, like "Truthful James" of Bret Harte's poetical fancy, he has been enabled to say, but in the most ordinary prose, "Ladies and gentlemen, there is no deception."

Then it was discovered why architecture had been an admitted failure since the revival of classical learning reformed the world. It lacked truth! Modern marble and stone were not marble and stone, but stucco! Then it was resolved that the principles of architecture must no longer be violated with impunity; and, as stucco had audaciously laughed them to scorn, it was necessary for the English artist to teach his less happily inspired countrymen the importance of artistic purity and truth. Stucco, therefore, acknowledged the power of the greatest number and retired into obscurity,—only issuing from it at intervals to improve a fallen neighbourhood or renovate an economical palace.

We are not going to break a lance on behalf of stucco and its wrongs; nor could we, even if so disposed, hold a brief for chunam, scagliola, gypsum, or any kind of cement; but the temper of Mrs. Grundy is so far moderated now as to permit a reasonable remonstrance against the prolonged ostracism of a material which gives to the rough nature of bricks something of that softness which manner gives to the rough nature of man. Addison, who, though an incompetent critic of the former, was a good judge of the latter, said,—"The very design of dress, good breeding, outward ornaments and ceremony were to lift up human nature and set it off to an advantage." If the "noble savage" scorned a lie, he also objected to many of those modern observances the disregard of which banishes some men from society and involves others in a temporary loss of liberty. Swift was probably only half-laughing at the world when he told it that "Good manners is the art of making those people easy with whom we converse," and surely to do that requires the effort sometimes of no small an amount of tact, if not of deception. The reproach of the Frenchwoman to an indignant lover, that people thought the things he said, but never said them, is perfectly consistent with even the highest morality. Although speech may *not* have been given to man to conceal his thoughts, it is certain that with speech he conceals them; and so admirable sometimes is modern training, that even an ingenuous countenance can be feigned; whereas, as Queen Isabella of Spain, in Bacon's time, used to say, "Whosoever hath a good presence and a good fashion carries continual letters of recommendation." Surely this good presence and this good fashion are but a covering to that material of which all men are composed,—a stucco, which, like that on "honest" brickwork, makes it smooth to the eye and soft to the touch. It is a covering also which admits of all sorts of adornment, both in the one and in the other; for what wit can effect for human, colour can effect for material, polish. You are no more justified in banishing stucco from your walls because upon some of them it has been falsely applied, than to condemn suavity of manner because it has often favoured the artifices of a knave.

It is very much to be doubted whether the ancients, having built a rough stone wall, ever refrained from improving its appearance by covering it with a coat of stucco lest the critics should accuse them of lying. On the contrary, they often made with rough stone and brick, covered with a coat of some kind of plaster, beautiful works of art; and such, according to Quatremère de Quincy, "have rather given birth to theories than theories to beautiful works." The Greek plaster, however, must have been a very superior description of covering; for from the walls of Grecian houses, according to Vitruvius, the decorated covering was often detached and carried by rich Romans to Italy to be incrusted in the walls of their town and country mansions. It is well known that at Herculaneum were discovered squares of plaster adorned with paintings, which had evidently been detached from some other place, and which the workmen had not had time to incrust in the walls of the house where they were found. The ruins of antique edifices in Rome, such as the Baths of Caracalla, of Titus, and of Diocletian, have shown a thickness of stucco of from 4 in. to 5 in. Mr. Newton, in the course of his explorations at Halicarnassus, discovered some fine specimens of stucco made of lime and pounded marble with ornaments painted on them; and at Rhodes he found similar fragments, which still retained their painted ornaments after long exposure to weather and rough treatment. Indeed, it is quite superfluous to attempt proving that the use of stucco is as old as architecture. Sometimes sun-dried bricks in early Egyptian monuments were coated and painted just as the walls of coarse tufa or travertine in the beautiful city of Rhodes were coated and painted, and as our modern walls are treated, though these with less valuable material and a less artistic mode of decoration. Coloured marbles were imitated in stucco by the ancients; and, in the Middle Ages, red lines were traced upon it to imitate, in perhaps a conventional fashion, the jointing of a stone wall. A stucco covering of some sort was spread over both the inside and outside of many ordinary stone buildings erected by the Greeks. On the outside it was comparatively thin, and frequently, if not always, coloured. On the ruins of a temple at Agrigentum there are now standing columns composed of several drums of rough stone covered with a thin white stucco of uniform thickness, hard, and beautifully smooth. Similar ruins, similarly stuccoed, are to be seen at Pæstum. In the Temple of Vesta at Tivoli, although the flutes of the column are made in the stone itself, their finished form is obtained by the stucco which covers it. Some Mediæval churches in England were stuccoed on the outside, and parts of the original coat have been found clinging to them. Many Italian masterpieces, with which the names of celebrated architects are associated, bear on their faces, pilasters and similar ornamental accessories, as defenceless in principle as those on the housefronts of Bloomsbury or Belgravia; and Mr. Ruskin is too honest to evade the fact that some of the "marble palaces" of Venice are faced with stucco; but he says it is "confessed and understood, and laid on the bricks precisely as gesso is laid on canvas in order to form them into a ground for receiving colour from the human hand,—colour which, if well laid on, might render the brick wall more precious than if it had been built of emeralds." The palace at Madura, the ancient capital of Southern India, is built of stone and brick, plastered, to which fact, according to Mr. Chisholm, is due its present existence.* Cairo, which has been the theme of so many rhapsodies about Oriental gorgeousness and beauty, is, as a whole, principally plaster and paint; and the palaces of Chowringhee, which astonished Macaulay as much as our "magnificent Regent-street" delighted him, are stuccoed from base-ment to roof.

The story, known to all, and frequently quoted by the more youthful, of that singularly acute member of our craft who, after having cut his own name on a stone wall, stamped that of the king, his master, upon the stucco which covered it, is eminently suggestive to moderns, who are often invidiously compared with their brethren of the past. The giants of those days seem all the greater now that every trace of their contemporary pigmies has disappeared. The dignity of history prevented us knowing, until the days of the most delightful of historians, many petty details about the mass of our countrymen, such as, in his own words, "how the parlours and bedchambers of our ancestors looked." It has, therefore, been the fashion to consider that since the "monuments" of antiquity and of the Middle Ages have resisted so long the ravages of time, the workmanship of the ancients and of our ancestors reached a degree of excellence which cannot now be approached. That it was superior no one is audacious enough to deny, but neither can it be disputed that all their bad work has disappeared. Philæ the Beautiful, the Athenian Acropolis, the Coliseum, the ruins of many a French and English castle, were surrounded in the time of their strength by a more or less teeming population contented with shelter of a comparatively perishable nature, which demanded constant attention at the hands of the inhabitants. Neither Phidias nor Praxiteles sought on the hill of Pentelicus the materials of their own abodes. The Athenian citizen was noted for the modesty of his dwelling-house; and far from building a home for posterity, or, as the French workman says, for eternity, he built a rough wall, which he left those who succeeded him to renovate with a new coat of stucco, or revivify with another and perhaps a different story. The modern weakness has long consisted of an attempt to imitate earlier public buildings in our domestic dwellings, with the sole result of bringing down our public monuments to a level with private buildings. The riches of the earth, say, have contributed to render the walls of a town-hall or a church brilliant with all the colours of the rainbow; therefore, unless you can command the former you must not hope to enjoy the latter! You must not hide the materials which compose your wall, according to the purists; you must not cover rough stone or coarse brick with plaster, for thereby you produce an effect of homogeneity the possibility of which is precluded by the numberless horizontal and vertical joints of a brick or stone wall. If you want colour you can get it out of the bricks themselves, and you may paint upon their surface. Even if the wall be of concrete, purists have objected to a coat of cement without, or a coat of gypsum within. They have always had at their command such missiles as "sham effects," "veneering," "imitation ornament," to fling at those who attempt to reason with them. Mr. Pullan, a short time ago, very naturally thought that to decline to hide the face of honest but ugly red brickwork with a coat of plaster is puerile. "I must confess," said he, "that I think it perfectly justifiable to use either veneer of marble, variegated scagliola, or coloured stucco, for the purpose of obtaining colour in cases where funds do not allow of the purchase of blocks of marble," and he added a hope that before long many of the dismal-looking churches erected in London during the last two centuries might be enlivened with polychrome. Mr. Penrose appears to entertain a similar opinion, for on the same occasion he was glad to hear that the coloured bricks often used in the interiors of churches are simply "ground" for future painted decoration! "In themselves," he added, "they appear crude, unfinished, and distracting, though sometimes used with great cleverness." But he denied that in all cases such a decorated colouring was intended, because, said he, "I have seen several restored churches in which I have grieved over walls left so rough after the removal of the plaster as not even to be suitable for garden fruit walls." Mr. Pullan's calm assertion shared with the rash impulsiveness of Mr. Penrose an equal fate. No less a person than the then President of the Institute of Architects fell foul of both. "It may be," he indignantly exclaimed, "that those who have so nobly lifted up their voices against this gangrene of modern architecture have fallen into the opposite error of purism; but surely in these days when every kind of counterfeit adulteration and practical

* Mr. Chisholm says, somewhat obscurely, that "had the design been carried out in stone, nothing would now remain but a mass of shapeless ruins."—Transactions, R.I.B.A., 1875-6.

falsehood pervades every branch of business, of art, and of manufacture, ... it is not the time to jeer at those who may possibly overstrain their protests against the practical vices of the age." No one will dispute the justice of Sir Gilbert Scott's remarks or dare to doubt,—even without the fear of Mr. Ruskin before his eyes,—the possible creation of Utopia. The ancient philosophy pretended to make all men virtuous; and virtue as the highest good is preached to all, properly enough, at the present hour. Mr. Disraeli in one of his novels has described a young gentleman who set himself the task, on entering Parliament, to abolish poverty,—success in which, one would think, might have helped to make truth universal. But, on the other hand, riches are known to be the impediments of virtue; and there is hardly a comedy of recent times which does not enlarge upon some text taken from the Great Book of Snobs. The purists have dozens of apt quotations at their command. Take only the indignant shopkeeper in the "Maison Neuve," where he upbraids his ambitious nephew and laughs at *salons* which lie from the mouldings of their doors to the ashes of their hearths; which are stucco looking like marble, pasteboard looking like sculpture, pear-tree looking like ebony. And then he points the moral,—"Rub and it comes off, strike and it chips! Hired lackeys that you call '*mes gens*,' friends that you do not know! . . . . . Familiars chosen like your furniture above your means, and, like it, second-hand! Everywhere, morally, physically, varnish, veneer, pasteboarding, and imitation-bronze." Surely, Mr. Penrose and Mr. Pullan, you must have forgotten that this was the stucco of an Empire which began with a *coup d'état* and ended with Sedan! Ought you not to thank our purists for pointing out faults which might drag this home of constitutional liberty and Portland-cement through the confusion of a similar fate?

Nevertheless, all the arguments and remonstrances against the use of stucco will not alter the fact that in this country we have comparatively little stone and less marble; and that even if we had a great deal of the latter, the climate is not favourable to its employment either on the outside or the inside of our houses. We have magnificent granites, and know how to polish them better than any other people in the world, but they are far too expensive to be used as mere wall lining; and the most we can hope to do is to make our columns and other important points of support of such materials. But in the modern rage for honesty it often occurs that a brightly polished granite shaft is placed in close proximity to a rough brick or a rough stone wall. The hesitation to hide this roughness with a smooth coat of plaster arises probably from a logical disinclination to mix up a thing so truthful as polished granite with a thing so false as stucco. Again, having very little stone, we found out how nature went to work to make it, and have succeeded in making a similar substance; but, with this difference, that the one is nature-made and the other art-made, and that while we are obliged to cut the former we must cast the latter in a mould. Suppose then that we go to work with nature's ingredients to make a stone wall—*sur place;* and that we have built the heart of the wall in Portland-cement concrete, can there be any objection to putting a covering upon it similar to the crust which is formed upon natural stone? Portland cement is one of the great facts of the day, and it is ashlar formed by hand upon the wall itself instead of being cut by hand in a workshop and inserted in the wall—with the exception, of course, that Portland-cement ashlar is often ½ in. thick, and Portland-stone ashlar often 3 in. thick. Strangely enough, although objection is made to stucco, none is made to mosaic. There are shafts of columns at Pompeii composed of brick covered with small cubes of marble; and these mosaics are nothing more than stucco concealing a core of inferior material. Bricks and terra-cotta blocks are after all only a species of stucco which has been baked and thus made ready for insertion in a wall instead of being run against it; and as the late Mr. J. W. Papworth said in one of his admirable papers, "if moulded terra-cotta is a truthful material, run plaster cornices are also legitimate." But putting the æsthetic part of the question on one side, and forgetting the *pros* and *cons.* of it, there can be no doubt that a great deal more plaster and paint, more stucco and mosaic wall-coverings, might be used with advantage in the insides of our houses; and that wainscoting and wood linings,—which the Greeks never used, and which in countries like India, for instance, cannot be used,—harbour vermin and insects; while paper even of the best kind is known to possess, in a sanitary point of view, absolutely dangerous qualities. If uncompromising truth in architecture be carried to its logical conclusion, painting and sculpture, which on a building are its subordinates, must often be positively false; for a painted perspective upon a flat surface, and a bas-relief in marble, are both attempts to deceive. The trunk of a tree should be carved in wood, a musical instrument inlaid with brass, and drapery worked in some kind of stuff. Probably Pope had a glimpse of the future, at least as far as the æsthetic development of "purism" goes, when he wrote,—

> "That live-long wig, which Gorgon's self might own,
> Eternal buckle takes in Parian stone."

The pages of this journal are not sufficiently encyclopædic to catalogue the many different sorts of stucco that, for the last two thousand years, have been used to envelop walls composed of materials quite as "honest" as any which, in this era of virtue, are too frequently left naked and unprotected. The MS. of Professor Donaldson's exhaustive treatise upon stucco, printed in the "Encyclopædia Metropolitana," lies open to all in the Library of the Institute of Architects. The *tectorium opus* of the Romans, with which Vitruvius has familiarised his readers, and the *chunam* of the Hindus, are probably of equal antiquity. At the present moment the preparation and application of the latter is best understood in the Madras Presidency. The plaster coats, on ancient Greek and Roman walls, consisted generally of three layers of mortar composed of lime and sand, and three others of stucco, composed of powdered marble and lime—the powder of marble being finer as each layer was applied until in the third it was exceedingly fine. Chunam is of two kinds; that used in parts of the interior of India being prepared from a gravelly kind of limestone, dug out of quarries, while that used along the coast is made from shells washed out of the salt marshes; and the latter is thought to be the more durable of the two. But the excellence of both depends undoubtedly on the mode of preparation and manipulation. The columns in the interior of Government House at Calcutta are coated with the very finest description of stucco, and it is affirmed that the materials (excepting, perhaps, the quartz sand) for making good shell-chunam are better in that part of India than in Madras, only in the latter Presidency the "elbow-grease" is more effectually applied. This shell-chunam is a fine impalpable powder, while the stone-chunam is a coarse sandy one. Both one and the other are mixed with clean sharp sand, in various proportions, according to the use for which they are intended. Mr. Chisholm has explained the process for which Madras is famous. He says:—"The first coat generally consists of three parts of river sand to two parts of shell-lime laid on roughly by trowel and hand-float. The second coat is composed of ground quartz, sand, and shell-lime in equal proportions, brought to a surface by Derby floats in the ordinary European manner. The third coat is a similar mixture, ground very fine to the consistency of cream. This is trowelled on, and polished with agates. After applying the creamy mixture, the workman continually rubs the surface with the agate held in the right hand, while with the left he occasionally dusts the surface with fine dry powdered quarts, contained in a small linen bag." If any one be imprudent enough to doubt the force of "elbow-grease," not only in the matter of good stucco, but of all materials with a "face," let him watch in Eastern India, native workmen polishing an oak floor with empty beer-bottles. The modern tendency, however, in this country, is not to obtain smooth or polished surfaces so much as to destroy dead ones, and this deadness is sought to be removed by stamping patterns upon it. We take it, on the contrary, that our English climate in general, and our London atmosphere in particular, demand the means of throwing off, rather than of harbouring, dust and damp, which, once combined, form dirt.

We said at the beginning that we held no brief for any kind of stucco; but if we have taken up its defence with a will, and have by any chance proved stucco to be right, we have proved ourselves wrong; for, undoubtedly, as the great mass of people have used it, do use it, and will continue to use it, it is irretrievably wrong. Witness the article in the *Penny Cyclopædia* of the year 1842, and compare the custom of to-day after thirty-four years of culture to boot:—"Much will depend upon the skill and care with which stuccoing is executed, on its being made to resemble stone as closely as possible both as to tint and the grain or surface; and in order to render the deception as complete as possible, it is important, though it is not always done, that lines should be made on the face of the wall indicating joints and courses of stonework. If perfectly well executed, stucco will be nearly equal in appearance to stone, and even superior to that of stone of inferior quality. There are some who protest against the use of stucco altogether, as a spurious and meretricious mode of building with sham material, but . . . it has been favourable to architectural design, and promoted a taste for it by allowing it to be executed when stone would be too expensive a material, or where, if stone were employed, the same extent and degree of enrichment could not be afforded." Happily there are not wanting thousands amongst the millions who inhabit these islands to understand the utter falseness of such an argument and the gross injustice thereby done to an excellent building material; and having such a warning before our eyes, some captious reader may well ask, why we wrote about stucco at all? Why not let sleeping dogs lie? Why stir mud any more than pitch?—for though stucco is neither mud nor pitch, the slime of the Tiber has helped to make one kind, and the slime of the Dead Sea another. Those, however, who love stucco will probably admit the excellence of any argument we may have used in favour of it, and those who hate it may recall a witty anecdote. When some good-natured friend told Stella how beautifully Swift had written regarding her rival she expressed no surprise, for she knew the Dean had also written finely about a broomstick. Many worthy people have, doubtless, long thought about stucco in a spirit similar to that which urged the satirist to treat of a broomstick; and so, perhaps, it is necessary now and then to say a word to such—not finely, but in a homely fashion—concerning an ancient material which in proper hands may be made just as artistic and lovely as it is comfortable and clean.

ROYAL ARCHÆOLOGICAL INSTITUTE.

The annual session of the members of this Association commenced on Tuesday last at Colchester, the reputed Camulodunum of the Roman period. At mid-day the Mayor and Corporation received Lord Talbot de Malahide (president) and the members of the Institute, and bade them a hearty welcome.

After luncheon in the Corn Exchange, Lord Carlingford, the president of the meeting, delivered an inaugural address, in which he showed the value of archæological researches, and traced the ancient history of the county and the borough.

We have so much archæological matter in our present number that we must postpone a report of the proceedings of this Institute.

Proposed Centennial Monument.—Lithographs are exhibited in Philadelphia of Mr. Story's design for the Centennial Monument to Liberty, which is to be erected in Independence-square, and for which subscriptions are invited. The *American Architect* says:—"They show a tall pedestal, surmounted by a colossal statue of Liberty, wearing the Phrygian cap, and carrying a flag, the staff, tipped with an eagle, in her right hand, her left hand resting on a shield. Around the upper part of the pedestal moves a continuous procession of female figures,—forty or so,—which typify the different States and Territories of the Union. The choice of Mr. Story is one of the many judicious selections by which the men of Philadelphia have shown their wisdom. It is, of course, impossible to judge of the effect of the sculpture from the somewhat rough lithograph that is published. The only means of showing it would be a sketch-model from the sculptor's own hand; and we have not heard that any such has been received. The figure of Liberty must be treated with much grandeur, in order to avoid the commonplace. To design the forty figures which encircle the pedestal, with the requisite variety and character, is an equally difficult task, one such as few sculptors of our day set themselves; and we can think of no American sculptor, except Mr. Story, in whose hands we should feel that it was safe."

"MERCANTILE ARCHITECTURE."

"Tomkyns,—Manchester Goods," is the inscription on the front of one of the warehouse designs given in Mr. Ogden's book, published under the above title,* and the inscription is not a bad indication of the character of the designs contained in it. Architecturally speaking, they are "Manchester goods"; and even if the author did not date his preface from that city, no one acquainted with the style and feeling of a good deal of its recent shop and warehouse architecture could fail to recognise the same characteristics in this collection of elevations for buildings of that class. The love of "chamfering" in all its most recondite and highly-developed forms, the desire for something clever and out of the way, the almost total absence of real taste and refinement in style and detail, combined with a considerable degree of cleverness and originality,—the qualities, in fact, which distinguish the type of modern Manchester architecture referred to,—seem to be systematised in this volume.

We are not on that account decrying Mr. Ogden's publication unreservedly. On the contrary, there is a good deal of ability in some of the designs, and the systematic consideration of mercantile architecture has not been much undertaken by architects, so that there is reason to praise at least the good intentions of a member of the profession who assists in drawing more attention to it, and indicating it as a special field for architectural treatment. If he appears to derive his style too exclusively from local influence and taste, that is a defect which may be corrected hereafter. And though many, we fear we must say the majority, of the designs in the book contain much that is offensive against good taste, some are good, and others are characterised by a degree of ingenuity and inventiveness which, though somewhat misapplied, must have due credit, when we consider what a "fearful wild-fowl" a blank sheet of paper, ready to receive "ideas," really is, and how much labour and contrivance of hand and thought must have gone to fill the fifty sheets this book contains with the (mostly) elaborate designs which they now exhibit.

The subject of warehouse architecture is really a rather extensive one, and includes problems beyond what are touched upon by Mr. Ogden. The word "warehouse" has, in fact, a somewhat varying signification. In many places, more especially in seaports, a warehouse is a building for the stowage of goods on a large scale and in their rough state, cargoes of bales brought straight from the ship's hold, &c.; a building for the stowage, but not for the exhibition, of goods. A considerable proportion of what are called warehouses in London are of this type, which in Liverpool and other large ports is the only class of building designated by that term. In Manchester a warehouse means, we believe, in the majority of cases, not a building for the stowage of raw goods, but for the stowage and exhibition of manufactured goods for sale. The two classes of buildings are perfectly different in their requirements and associations, architecturally speaking. The warehouse for stowage of heavy goods not immediately to be required, of course is naturally a much more plain and massively-constructed building than that for manufactured goods which are to be displayed, or which are in course of regular sale on the premises. In fact, the stowage warehouse used to be considered a mere matter of building thick walls, and hanging strong floors in them; and some large seaport towns are fearfully disfigured by the enormous cubes of unsightly brickwork with barred windows, which seem to be considered the necessary and normal type of the warehouse. Lately it has been perceived that such buildings do in fact, offer opportunity, at little extra cost, of realising a great deal of very fine, though stern, architectural expression, and may even be made to produce something far superior, in dignity and massiveness of effect, to what we are generally able to achieve in civil and domestic architecture. This has been, to a certain extent, recognised in London, and attempts, creditable both to owners and architects, have been made to render this class of building a means of adding to the architectural interest of a neighbourhood, instead of defacing it. More may be done in this way than has yet been accomplished; the great desideratum being that nothing pretentious or ornate should be aimed at; that the architectural effect should result simply from the frank treatment of the building so as to emphasise its strength where strength is most wanted, and so as to give to its practical features their most effective grouping and treatment without descending to mere ornamental additions. Far more in the way of really fine architecture is possible with a building of this class, treated in this way, than we generally get; it demands, more than most things, the perception and feeling of a true architect, whose consideration and taste need not be considered as thrown away because expended on a building for so practical—we will not say so prosaic—a purpose, for we do not regard commerce as prosaic. We may just allude to the fact, which some of our readers may remember, that one of the very best things ever done by a contemporary architect whose name has been spoken of most in connexion with the art side of architecture, was—a drysalter's warehouse. Since then we can recall having noticed warehouse designs, of the same class, among some of the best things in the architectural room at the Royal Academy, so that some at least among the cleverer members of the profession have "gone and done likewise."

The warehouse for manufactured goods admits of more decorative treatment. It is, in fact, a sort of commercial palace, intended to indicate by its outward richness of treatment the wealth of the owner of the stock; so, at least, we have always considered the Manchester "warehouse," corresponding perhaps to the American "store," to be so intended. This type of building is evidently contemplated in the warehouse designs in the present volume we are speaking of. They are both too ornate in style, and too deficient in solidity and mass, for warehouses for stowage of heavy goods. Regarded in the former light, some of the designs have considerable merit; chiefly those in which the least effect is aimed at. Some of them have been made for special situations, such as where there is a narrow street, and it is important to cut off as little light from above as possible; or where rights of light affect the upper story though not the lower, &c. The strong point in the best of the designs lies in the manner of grouping and disposing the windows, in which considerable originality and perception of effect are evidenced. In this respect the elevations shown on plates 38 and 41 are good and suggestive; and plate 36 shows a sensible and suitable front, of a plain unpretentious type, with the two upper stories contrived so as to fall back from the line of front and allow of light passing. In many of the designs there are points which are suggestive, and which, if worked out with more refinement, would produce some novel and picturesque results. But as treated here, the vulgarity of some of these designs is astounding. The author deliberately professes, in his preface, to have aimed at producing designs "entirely eclectic" in character, "preferring to select and combine features of beauty and utility from any available source, all picturesqueness of grouping or detail save that springing from evident and natural requirements being avoided." Now, there is a good deal to be said for eclecticism in one point of view; but, to be worth anything, it must be the result of a study of various styles till their principles are mastered, and till the designer, taking into account what there is in common between them in essentials, is able to modify their characteristics so as to meet each other half way, if one may so put it, and make a congruous whole. We do not say this is often done with success; but it may be and has been accomplished with very good effect and originality. But deliberately to take features of various styles and bundle them together, as Mr. Ogden has done, is only the way to produce monstrosity and a sort of architectural chaos,—a result which he has most successfully accomplished. Anything more deliberately hideous than the design on plate 34, for instance, it would be difficult to imagine; and some others are nearly as bad. In some which are not so objectionable otherwise, such as plate 50, the tenuity of the piers, presuming them to be, as they apparently are, of stone, destroys the effect of the whole. Plate 45 shows a better instance than some of them of the combination, to a certain extent, of Classic and Gothic detail; an experiment which has been not unfrequently tried, and which is sometimes successful, as in this case, when the Gothic forms are not very pronouncedly Gothic, and the Classic features are somewhat modified to harmonise with them. The author seems to have a great fancy for playing clever, or at least odd tricks with string-courses and window-labels, especially of making the latter interpenetrate and cross each other, in a manner which is essentially unarchitectural, and makes these features seem mere bits of ribbon-work stuck on to the surface of the building, instead of integral features of the masonry; and in several places he makes the crowning mouldings of the raking cornice on a dormer window mitre and cross each other, and continue past the apex in two horns, like the angle of an "Oxford" picture-frame. The effect of this, even in the drawing, must be seen to be appreciated; in execution it would be still worse. No designer possessed of a particle of what may be called architectural morality would perpetrate such a thing. Even in some of the better and soberer designs, we doubt whether the author has realised what would be the effect in execution and in perspective of some of the "dodges" which he draws in elevation. How does he think, for instance, that the ground-floor piers in plate 38 would look, cut up on both sides into such large and irregular chamferings? They would appear very twisted and awkward, and very insufficient for the superstructure; for the eye would judge of their width, in perspective, by the breadth of the flat surface left on the wall plane, a mere strip compared with that of the flat pier of the story over. In putting in chamfers in elevation, designers often seem to forget that what appears to strengthen a feature when drawn in elevation, by the adding of lines, weakens it in execution, both really and apparently, by removing material. Chamfering is a glorious way, no doubt, of manipulating the lines of a design and giving it piquancy, *on the drawing-board*: it has become almost a special art now, with such innumerable varieties as to seem to merit a special treatise to itself,—"The Complete Chamferer," for example. Only unfortunately these piquancies have a tendency to look very different in execution from what their appearance on paper would lead the unsophisticated mind to expect.

The designs given for offices do not seem to us to differ materially in treatment from those for warehouses, except in having, in some cases (but not in all), a larger proportion of window space. On the whole, they include the best things in point of design, though containing, also, some things that are fearful and wonderful. Entire want of repose is a quality which no cleverness can atone for, and which is painfully illustrated in some of these designs. Plate 19 shows an office design, one of the best in point of taste, which is referred to in the preface as "calculated for a position requiring additional means of light." Apparently this is understood to be provided for by the arrangement of the windows on the plan of a rather flat bay-window. As we have several times met with this odd idea that a projecting bay-window gives more light to an apartment than one in the plane of the wall, it may be as well to point out, what one would have thought was obvious to any one, that you can get no more light into the room than the opening in the plane of the main wall will admit, and that, in fact, a bay-window (unless made with a glass roof) rather operates in depriving a room of some of its light, by the amount which its roof cuts off. Any one seated actually in the bay of course gets more light than through an ordinary flat window, but the room itself gets less.

We take the author of "Mercantile Architecture" to be a young member of the profession; and under such a supposition the work which he has produced is, in some points, undoubtedly creditable to him. Its title is too ambitious, and it does not touch upon the special style of mercantile building, the "warehouse" properly so-called, which gives opportunity for the most marked and distinctive architectural treatment; and there are a good many designs in it which the author will probably condemn himself before very long. But there is a certain spirit, cleverness, and originality about even some of the more objectionable ones, which is, perhaps, more promising than merely dull good taste running in a well-worn groove.

* Studies in Mercantile Architecture: comprising Fifty suggestive Designs for Warehouse, Shop, and Office Dwellings, suitable for the Commercial Districts of large Cities. By W. Sharp Ogden, architect. London: Batsford.

Albrecht Durer.—"The Personal History of Albrecht Dürer, of Nürnberg, his Works and Times," which was in course of preparation by Mr. Henry F. Holt at the time of his death, has been completed by his widow, and is about to be published.

AMERICAN "COTTAGE" ARCHITECTURE.

Our American cousins seem willing to let us know that they are not asleep about architecture, and volumes illustrative of the progress of the art, and the attention paid to it, in the States, reach us "quite" frequently. The publication* which forms the latest instalment exhibits remarkably one accomplishment in the way of getting up a book in which we are by no means so proficient on this side of the Atlantic: we allude to the manufacture of title-pages. The title-page of the book before us is itself a literary effort. It includes over 180 words, and would fill about a quarter of our column if reprinted in full, even in "close order." In it we read that, in addition to the general plans and designs of houses engraved, there may be found "a great variety of designs for cornices, brackets, windows, window-caps, doors, piazzas, porches, bay and dormer windows, observatories, towers, chimney-tops, balconies, canopies, scrolls, gable and sawed ornaments, fences, stairs, newels, architraves, mantels, plaster finish, &c., &c." "That's your sort," as *Goldfinch* says in the play. One almost gasps on reaching the final "&c., &c.," and contemplating the possible vistas of further information thereby suggested. The list reminds one of the advertisements of Messrs. Flashman & Co., who invite you to "furnish throughout" from their celebrated establishment. We fear the parallel may be carried further, and that persons going to build, who endeavour to furnish their brains from Messrs. Bicknell's publication, will find the real contents of the establishment sadly at variance with the grandiloquence of the advertisement.

The book is, in fact, a jumble of designs, among which all the articles enumerated in the title-page may be included (we do not see where "towers" come), but which, in fact, offer very small choice to any one looking for hints or precedents. Such a publication is utterly useless in England, as the few things in it that are at all good are only adapted from contemporary English work; and few persons of educated taste in this country would find anything to admire in the ornamental designs, which, though not altogether devoid of merit, are mostly, not to say entirely, in a very commonplace style. The volume may have a certain amount of interest as indicating (if we are to take it as indicating) the progress of taste in domestic architecture in the Northern States; but we are inclined to doubt its being any fair test of this.

The main title of the book is itself puzzling, as one cannot see why "detail, cottage, and constructive architecture" should be severally enumerated as separate branches. Cottage architecture must also be constructive architecture, so that the division is unmeaning. It would seem, from a comparison of the contents of the book, that the term "cottage architecture" is used in a wider meaning than with us, and is applied generally to the class of houses for which we have no better name than "villas," including dwellings of some considerable size. Among these it may interest English architects to see what is termed in an American publication a house "in the Domestic Gothic style" (pl. 15), and its details on the next page. Some of the details of woodwork based on Renaissance forms are better, and are rather fanciful and effective; indeed, it seems that in assimilating or using up the styles of the Old World, American taste in design harmonises better with Renaissance than with Gothic feeling, and makes more out of it. Whenever anything like Gothic detail is given in American architectural publications, it seems to be mostly of the Batty Langley type, or reverting to that. There are exceptions; and there are not wanting eminent and cultivated members of American society who have carried back to their own land from Europe a true perception of what makes the real excellence of Mediæval art, and whose influence may be felt in time; perhaps is already felt more than we know of here. But as far as we can judge from the architectural publications which reach us from America, the standard of taste and knowledge in these matters is either still low, or is inadequately illustrated. Publications of the kind we are alluding to seem, moreover, to be too little under educated professional control, too much under mere publishing influence. The present work, like one we recently noticed at some length,† seems to be the enterprise of a publishing firm only, and no professional or architectural editor's name appears in connexion with it; nor have the designs any designer's name, except that in the case of a few general views and plans of houses the architect's name is appended.

Among the designs for houses, almost the only two which we can like are two geometrical elevations in a more masonic and less "Swiss-cottage" manner than the rest; one a design for a house in flats on the French system, the planning and lighting of which, by the way, are rather ingeniously though simply contrived, except that we cannot make out the W. C. provision, or whether there is any at all; and the other a page of designs for some ordinary three-storied street houses, which are simply but effectively and suitably treated. Some of the details for woodwork are not bad, though in a rather common-place taste, and without sufficient profile sections and constructional detail for a book which professes to fulfil a practical object. The designs for "cottages and villas" on a smaller scale, are of a sadly gimcrack type. In one point, however, we have learned a more dignified phraseology. We notice that in the plan of the house in flats before mentioned, what we should call the "lifts" for tenants and for coal have a nobler nomenclature, and are lettered as "passenger elevator" and "fuel elevator." That is the one thing we can profess to have learned from Messrs. Bicknell & Co.'s publication; and we hope that in future a lift will always be spoken of, by all educated architects and builders, as an "elevator."

Let it be distinctly understood that we have no desire to banter American architectural works, as such. We know that there are very able and clever architects in America; we read occasionally admirable addresses and papers delivered at professional meetings in the States, and reported in professional papers. But our complaint is that we can find little evidence in American architectural publications,—such, at least, as reach us,—that the members of the profession in the States are exercising any important or serious influence on the taste of the general public, unless it be through some of their buildings. Architectural publications seem to be left to the enterprise of publishers, and as a mere matter of business, and got up in a popular rather than in a really architectural spirit. We see and know of no such works as are frequently brought out by English architects; works dealing ably, both scientifically and artistically, with important branches of architecture and archæology, and illustrated in a first-class manner by the pencil or under the direct superintendence of the author. Of archæology there is, of course, necessarily little for the American architect, in relation to his own country. But, unless architecture is more empirical, more destitute of guide or landmark, in America, than we should wish to suppose, we cannot understand why the publications illustrative of the art which reach us from the new country should be so far inferior in every respect to those we are accustomed to see here. There is surely something for the American architects to do in this respect; some room for them to make further efforts towards rendering the art better understood and appreciated, by illustrative and critical publications somewhat less commonplace in matter and style than what we have hitherto seen; publications in which the subject is treated of with the comprehensiveness, accuracy, and artistic feeling of a trained professional mind, and not with the shallow empiricism of a trading firm making a book. If we have appeared somewhat harsh in our comments on this and one or two previous publications brought out in America, it is because we feel that the work is being done there by the wrong hands and in the wrong way. Let any of the really able men in the profession in America illustrate their art in publications in which their best ability and research are shown, and which bear the stamp of professional authority, and they may be sure of a hearty welcome and an appreciative criticism in our columns.

* Detail, Cottage, and Constructive Architecture, &c. New York: A. J. Bicknell & Co. London: Sampson Low & Co.

†† "American Interiors:" see *Builder* for June 3rd of the present year.

KINEMATICS OF MACHINERY.*

Formerly a machine was considered as a whole, but Professor Willis, in his "Principles of Mechanism," separated the ideas of force, time, and motion, and considered motion without reference to the other two, calling the study thus separated the science of pure mechanism, and hitherto writers have examined mechanisms as a whole, without attempting to analyse them, or to investigate their mode of formation; but the translator (who is professor of mechanical and civil engineering in the University College, London) says in his preface that the author,—Professor Reuleaux, of Berlin,—has followed a better method, which, in the following remarks, we merely indicate, and by no means fully explain. Every one who has or thinks he has invented a machine should study the principles laid down by the author, before taking proceedings to obtain a patent; and in any case the study will be useful in enabling the inventor to simplify the movements of the working parts, and so enhance the value of the machine. Practical John Bull must study principles more than he has done, in machinery as well as in other things. "Theory and practice," says the author, "are not antagonistic, as is so often tacitly assumed. Theory is not necessarily unpractical, nor practice unscientific, although both of these may occur. The popular antithesis should rather be between theory and empiricism."

Kinematics is commonly defined as the science of motion,—of pure motion; the word is used by the author in the limited sense, for the science of constrained motion, that is, motion as it occurs in machines, without reference to the ideas of either time or force; but the translator says that in this country it cannot now be adopted in that limited sense, for it has obtained a firm hold in a much more extended sense, and one which is, moreover, quite legitimate; and he has therefore changed the original title *Theoretische Kinematik* to "Kinematics of Machinery." As yet, he says, we have no word for the study of motion as change of position merely; he suggests Metastatics for the purpose.

The aim of the author is to determine the conditions which are common to all machines, in order to decide what it is, among the great variety of forms, that essentially constitutes a machine, and shows that the proper definition of a machine is "a combination of resistant bodies so arranged that by their means the mechanical forces of nature can be compelled to do work accompanied by certain determinate motions"; and kinematics is thus "the study of those arrangements of the machine by which the mutual motions of its parts, considered as changes of position, are determined." The difference between this definition of Kinematics and that which Ampère (who invented the name) indicated, is that it is made to belong essentially not to mechanics, as with Ampère, but to the science of machines.

Searching back in history for the origin of machines, and still further back into the past, the author contradicts the popular notion that the lever was the first machine. "In taking the lever as the first machine, we think of men's attempts to deal with or overcome great resistances. It is not this, however, which first attracts the opening consciousness, but is much rather the accompanying phenomenon, *motion*. The child shows the most lively interest in the sails of a windmill, in the mill-wheel, and other such portions of machinery as have distinctly regular motions; at first, however, he thinks nothing of the forces applied or brought into action by them. The separation of the idea of force from that of motion is a very difficult mental operation, and we find it occurring late and gradually. We find, accordingly, that the machines coming first from the unaccustomed hands of their makers are those in which forces play a comparatively subordinate part,—for they do not exceed the exertions which the worker himself makes, imperfectly conscious of what he is doing. This really lies at the root of the continual recurrence of the problem of perpetual motion; certain minds are always irresistibly attracted by the motion itself, by the first impression gained solely from external appearances, from the overpowering influence of which even the most accomplished cannot boast themselves to be entirely free."

Geiger, says the author, in his excellent little work on the origin of tools and the production of fire, comes to the conclusion that rotary motion was the first that men produced by any arrangement which could be called machinal. A piece of wood, roughly pointed at one end, is placed perpendicularly upon another, in which a small hole or recess has been made, and is caused to twirl rapidly backwards and forwards by the hands until the shreds rubbed off the wood, or some fibres of cotton or fragments of pith placed upon it, catch fire. (Tylor, "Early History of

* The Kinematics of Machinery. By F. Reuleaux. Translated and edited by Alex. B. W. Kennedy, C.E. London: Macmillan & Co. 1876.

Mankind." London, 1870, § 241; and Klemm, vol. ii., § 66, are referred to.)

"The discoveries made in recent excavations allow us to conclude with great certainty that primitive nations used some such arrangement" as a cord wound round a twirling stick, its ends held in the hands and pulled backwards and forwards, the upper end of the stick being sharpened, and the required downward pressure given to it through a third piece of wood similar to the under-piece, held and pressed down by a third worker "for working those borers with which to our astonishment they were able to drill holes in wood, bone, horn, and even very hard stone." The secret was that sand and water were used along with the boring-pieces.

In a machine, the moving bodies are prevented by bodies in contact with them from making any other than the required motion, and "*a machine consist solely of bodies which thus correspond, pair-wise, reciprocally.* These form the kinematic or mechanismal elements of the machine." The shaft and the bearing, the screw and the nut, are examples of such pairs of elements. The kinematic elements of a machine are not employed singly, but always in pairs, and the machine cannot so well be said to consist of elements as of *pairs of elements*. A large number of motions can be obtained simply by pairs of elements, and the combination of pairs of elements is called a chain, or more fully a kinematic chain. The body which is formed by the junction of the elements of two different pairs is then a link of the kinematic chain, and when all the links are constrained to execute determinate relative motions the kinematic chain is said to be closed, the whole forming a linkage returning upon itself like an endless chain; but to obtain absolute and definite motion one link of the chain must be fixed in position relatively to the position of surrounding space assumed to be stationary. The relative motions of the links then become absolute. A closed kinematic chain, of which one link is thus made stationary, is called a mechanism. A kinematic mechanism is moved if a mechanical force or effort be applied to one of its movable links in such a way as to alter its position. The effort thus applied performs mechanical work which is accompanied by determinate motions; the whole, that is to say, is a machine.

Having, in 128 sections of the book, occupying 486 pages, and with the help of 355 figures (some of which are elaborately defined), examined the machine as a combination of constructive elements, and also investigated the nature of the latter individually, the author arrives at his final problem,—the examination of the machine as a whole. He first examines the way in which it has been usual to treat the subject. The usual conception of a complete machine has been that it consists of three parts or groups of parts, viz.,—(1) The receiver of energy, or the receptor; (2) the parts transmitting motion, or the communicator; (3) the working parts, or tool.

The part or group of parts constituting the receptor is generally understood to be that upon which the natural force driving the machine acts directly; the tool is the part by means of which the energy received by the machine is directly expended in producing the required change in or in connexion with the body to be worked on. As the motions of these two sets of parts are seldom identical, the second group of parts is required to transmit motion from one to the other. But if we look, says the author, more closely at this idea, we shall find that we are treading upon very uncertain ground, for if every complete machine must have some motor,—must be driven by steam, air, water, gas, &c.,—then evidently the lathe and planing machine cannot be complete. Scarcely any of the machines in a factory, indeed, could be considered as complete. The common usage, therefore, in which they all receive the name "machine," must be entirely inaccurate; and he goes on to show that the tool is not an essential part of the machine, it is accidental to it only. Then, as to the receptor, he is led to the conclusion that it does not form an essential part of the complete machine, being that part to which water, wind, steam, gas, a weight, a spring, or a living agent, directly imparts the energy by which the machine accomplishes its work; the receptor is a link in the kinematic chain,—the piece through which the driving effort is introduced forms a part of the kinematic chainage of the machine.

In his closing remarks the author says it is very noteworthy that all the principal problems of machinery are connected with a comparatively very small number of kinematic chains; these are the screw chain, the wheel chain, the crank chain, the cam chain, the ratchet chain, and the pulley chain. The problems not covered by these chains are all more or less inferior in importance.

SIR GILBERT SCOTT, R.A., ON ST. ALBAN'S ABBEY.

The Architectural Society of the Archdeaconries of Northampton and Oakham visited St. Alban's on the 19th and 20th ult., when Sir Gilbert Scott gave a *viva voce* explanation of the architectural history of the abbey, which, he said, was founded in early times by Offa, but no remains of the original building existed, except a few materials which were used up again in rebuilding the church, viz., some turned balusters of Saxon origin. It was known in the history of the abbey that the three last Saxon abbots had intended to rebuild the abbey on a grand scale, and had collected materials for that purpose from the ruins of Verulam. The task was inherited from them by the first Norman abbot, Paul, cousin of Lanfranc. He set to work about the building some few years later than Lanfranc set about building Canterbury Cathedral, and he made it very much larger than the contemporary church of Canterbury, but it was very much shorn of beauty in consequence of the untractable nature of the materials collected by his predecessors. The parts remaining of Abbot Paul's church were very massive, very noble and very grand, but were almost as entirely without architectural detail as any great engineering structure of the present day. The tower was the most perfect part remaining of the Norman church, and they would see the arches of a great part of the interior of the church still retaining the form then given them. Some little work was done by later Norman abbots, particularly at one of the transepts. At the end of the twelfth century one of the abbots, John de Cella, conceived the very ambitious idea of rebuilding the nave and west front. Many of them might have seen the account Matthew Paris had given of his extraordinary failures in carrying out this project. He could not obtain funds, and a good deal of what he rebuilt fell down, but a small portion of his work still remains, showing that his design, if it could have been carried out, would have resulted in the erection of one of the most magnificent structures of which this country could boast. He did not know any Early English work existing which was finer in its details than these unfinished remains he had left us. The work was taken up after his death, in 1214, by his successor, Abbot William de Trumpington, who carried out five bays on the south side of the nave, and four on the north. Trumpington's Early English work fell very short in beauty of that of Abbot John de Cella. The next work was done by Abbot John de Hertford during the latter half of the thirteenth century, when the eastern arm of the church gave way. The work was continued by his successor, Roger de Norton, to whom they owed, no doubt, the whole reconstruction of that part of the church at the end of the thirteenth century. This abbot prolonged the abbey towards the east, and there he (Sir Gilbert) would be able to show them some most beautiful chapels De Norton commenced and nearly finished, and the lady-chapel which he commenced, but did not nearly finish. During the abbacy of Hugh de Eversden, who finished the lady-chapel, a catastrophe occurred in the nave. Several Norman bays which had been left by Abbot Trumpington suddenly fell, and Hugh Eversden built them, or rather began to rebuild them, with the beautiful later decorations of his period, but with a boldness which hardly belonged to that period. He appeared to be rather carrying out the idea of the bolder work of Trumpington. The work went on for a considerable time, and was at length completed. This, he believed, nearly completed the outline of the history of the structure; but to be added to that was the erection of innumerable tombs and screens, and magnificent works of various kinds, of the history of which it was no use attempting to give any outline. He would only, in conclusion, say two or three words about the restoration which had been going on for the last four or five years. It was originated, he might say, by a very alarming occurrence—the appearance of some terrible cracks in one of the piers of the central tower, at a time when he had a little work going on in the abbey. His clerk of the works, Mr. Chapple, he believed first noticed them, and pointed them out to him and others. Steps were immediately taken to save the tower, which was in imminent danger of falling, and a small fund was raised for this purpose. This work turned out to cost a great deal of money, but it was done in time to save the tower, which he believed was now as strong as ever it was. The restoration was afterwards continued through to the eastern arm of the church, and partially into the eastern chapels beyond. Those chapels were taken in hand by Lady Salisbury, and they had been saved from absolute ruin chiefly by the aid of subscriptions collected by the ladies of Hertfordshire towards her fund. That fund had ceased for the present, but he hoped it would shortly be set on foot again, and these magnificent chapels restored to their pristine beauty. They had also carried on the work as far as the rood-screen, which separated the choir from the nave, but they had not had funds sufficient to make it perfect. The money had, he believed, been spent thoroughly well, and not a shilling had been wasted on what any one could fairly wish had been left undone. The building had been placed, as far as the funds would go, in a perfect state of repair, and a great many antiquities had been brought to light during the progress of the restoration. One thing especially had occurred which he ought not to leave unmentioned, viz., the recovery of the substructures of the shrines of St. Alban and St. Amphibalus. There were some blocked up arches at the east end of the church. The late rector, Dr. Nicholson, commenced the opening out of these arches, and in doing so found a great many beautiful marble fragments. At first he did not know what they were, but on reference to documents relating to the abbey he believed them to be portions of the shrine of St. Alban. Nothing more was discovered until 1872, when, perhaps surreptitiously, for they were never commissioned by the committee to do so, they opened out all these arches, and found upwards of 2,000 fragments of the marble shrine of St. Alban. These fragments were very skilfully and ingeniously fitted together, and the structure set up again in the place where the sockets still remaining showed that the shrine formerly stood. The shrine of St. Amphibalus, fragments of which had also been discovered, was only partially restored, but they still had an immense quantity of material, and hoped to be able to make it as perfect as the shrine of St. Alban itself. He would only add one or two words. Their funds were absolutely exhausted, and he did not know that they had any immediate prospect of obtaining fresh funds, but he thought he might say that if they were not forthcoming, and that pretty rapidly, and on a large scale, the country would be disgraced, and that magnificent fane would be left in a half-ruined state, a witness of shame to the nation that had suffered it so to remain.

On the following day, Sir Gilbert described the sites of the apsidal chapels formerly at the end of the transepts. The visitors then proceeded to the south side of the abbey at the east end, and afterwards to the west end of the nave, where the examination of the interior was commenced. Sir Gilbert Scott again referred to the attempted reconstruction of the western part of the abbey by John de Cella (1195–1214). This abbot, though a man of great artistic taste and skill, was unfortunately not a man of business, and, having demolished the vast Norman façade, he exhausted all methods of obtaining money (including that of sending a monk about the country who declared he had been raised from the dead by the relics of St. Amphibalus) and was unable to carry on the work of rebuilding it. At the request of Sir Gilbert Scott, Mr. Ridgway Lloyd read the account given by Matthew Paris of De Cella's failure, and Sir Gilbert remarked that the account was a very good specimen, not only of Mediæval history, but of Mediæval joking. The abbot appears to have been victimised by his first builder, Hugh Goldcliff, "a man deceitful and false, but an excellent workman," and he was forgetful, writes Matthew Paris, "of the admonition mentioned in the Gospel to him who is about to build to compute the cost, lest all begin to jest at him, saying, 'This man began to build and was not able to finish.'" The work was for a time abandoned, and fell into decay, "the ruins of the flowers and images provoking the beholders to laughter." John de Cella was ultimately obliged to limit himself to the erection of the three beautiful portals of the western front, with their exquisite marble columns and carved capitals, which were most probably de-

signed by his second architect, Gilbert de Eversbot. This work, Sir Gilbert said, was as perfect of its kind as any work in existence in this country, and there was very little at all equal to it. The succeeding abbot, William de Trumpington (1214–1235), resumed the work of rebuilding, which De Cella had been forced to relinquish, but he cut down and modified in a remorseless manner the details of his predecessor's designs, as may be seen by examining the work of the one abbot and that of the other at the points of junction. By this means he was enabled not only to complete the west front, but also five bays on the south side and four on the north, besides other works of minor importance. Abbot Trumpington's work is an exceedingly fine example of Early English, but, to quote Sir Gilbert's Scott's expression, is less *spirituel* than John de Cella's. He probably, however, used up several details already prepared by Abbot Cella, including some marble columns with rich capitals. The visitors next proceeded to examine the five bays on the south side of the nave, which continued the work of Abbot Trumpington, and Mr. Ridgway Lloyd read the account left by Walsingham of the sudden fall of the Norman piers on this side of the church during the abbacy of Hugh de Eversden (1308–1326). This abbot began their reconstruction in the style of his own time, but so far modified as to bring it as much as might be into general harmony with the older and simpler work of Abbot Trumpington. In the lady chapel, which was also for the most part the work of Hugh Eversden, we find the same style of architecture carried out without restraint and with more lavish profusion of ornament. The work was continued by his successor Richard de Wallingford, who, however, suspended it in order to devote his attention to the construction of an astronomical clock which denoted the fixed stars, the course of the sun and moon, and the ebb and flow of the tide. When remonstrated with, he remarked that there were plenty of men to build a church, but there was no other man living who could make such a clock.

A short account of the series of ancient frescoes on the Norman piers which were brought to light in 1862 was given by Mr. Ridgway Lloyd. Those representing the Crucifixion have been supposed to indicate former position, of altars, but the more probable theory is that they were "stations of the Cross," notwithstanding that they represent the Crucifixion instead of a series of incidents terminating in the Crucifixion. Among the other frescoes is a gigantic figure of St. Christopher, carrying the infant Saviour in his arms, and the figure of an Archbishop, supposed to be St. Thomas of Canterbury. It may be mentioned that in a temporary vestry at the west end of the nave were exhibited a number of the engravings from the drawings of St. Alban's Abbey, by Mr. James Neale, F.S.A., for which he last year obtained the Pugin Travelling Studentship and the medal of the Royal Institute of British Architects. Sir Gilbert stated that these beautiful drawings formed part of the work on St. Alban's Abbey now in course of publication by Mr. Neale.

After finishing the inspection of the nave the party proceeded to the presbytery, and having taken his stand under the tower, Sir Gilbert Scott explained the arrangements of the choir. In the course of his remarks he said that until he heard Mr. Davys's interesting paper, he imagined that the two doors of the rood-screen were those by which, in former times, the people were in the habit of entering the choir, but Mr. Davys had shown that the people did not come through those doors, but only the priest officiating at the great altar of the nave, the arragement being the same as at the eastern end of the church. He understood Mr. Davys to conclude that this was the usual arrangement in the churches of Benedictine monasteries. This would be an interesting subject for discussion. The Rev. O. W. Davys then made some further remarks on the subject, especially in reference to similar arrangements of the choir in other churches. He said that if the choir of St. Alban's was restored, as he trusted it might be, in accordance with the ancient ground-plan which had been preserved, it would be simply impossible to have a more splendid choir for the celebration of the choral services of the Church of England, while space would be left open as at Westminster for the accommodation of a large congregation. The sacrarium would be the grandest possible place for ordinations and great diocesan services which might from time to time be held there.

Sir Gilbert Scott said he had already referred to the fact that the reconstruction of that (the eastern) part of the church (which had previously terminated in a Norman apse) was begun in the reign of Henry III. (the Early English period), by John de Hertford, and continued by his successor, Roger de Norton. Now it was recorded in the annals of the monastery that Abbot Norton was buried in the middle space before the high altar, and his heart before the altar of St. Mary of the Four Tapers, in one of the eastern chapels. His burial in the place of highest honour was a moral proof that he rebuilt that part of the church, and the burial of his heart before the altar of St. Mary of the Four Tapers, was also a moral proof that he founded the little chapel thus dedicated. The receptacle of the abbot's heart has been recently discovered. It was enclosed in a small wooden box of Oriental workmanship, with an inscription on the lid, which has been examined by Sir Henry Rawlinson, who pronounced it to be a genuine Arabic inscription, and who had deciphered one word,—the name of the Almighty. A curious instance, said Sir Gilbert, of the way in which structural antiquarianism sometimes illustrates documentary antiquarianism was afforded by the fact that the discovery of this box led (through the suggestion of Mr. Lloyd) to the discovery, on his examining the original MS. at the British Museum, of an error in the printed text of the annals of John de Amundesham, viz.: the substitution of the words *cujus corpus* for *cujus cor*. The architecture of the eastern part of the church was exceedingly beautiful. The painting on the presbytery ceiling was probably done by Wheathampstead; but traces of an earlier painting underneath (as on the choir ceiling) were discernible. Mr. Davys then said a few words about the great altar (or Wallingford) screen, of which John of Wheathampstead was the original architect. He also referred to the beautiful tomb which is generally believed to have been built by his successor as a memorial of that great Abbot, though Mr. Ridgway Lloyd concludes from a passage in the records of the monastery that, notwithstanding the inscription and the wheat-ears on the tomb, it is the tomb not of Wheathampstead, but of Abbot Wallingford himself, and he conjectures that Wheathampstead was buried in one of the southern extra-mural chapels.

The visitors afterwards passed into the south transept, where a vast number of fragments of mouldings and sculpture, which have from time to time been discovered in various parts of the abbey, were arranged in chronological order. Here Sir Gilbert Scott pointed out the Saxon balusters in the triforium, to which Norman capitals and bases have been added. The slype was then inspected. On each side of it is a range of intersecting semicircular arches, with elaborately-carved capitals,—the only example of the Later Norman work to be found in the church. On arriving at the Saint's Chapel, Sir Gilbert Scott called the attention of the visitors to the newly-discovered substructure of the shrine of St. Alban, which was erected in the time of John de Marynes (1302–8). Upon this pedestal formerly rested the *feretum* or shrine proper, containing the saint's relics, and covered with silver and precious stones of inestimable value. A monk was stationed day and night in the watcher's gallery to guard the shrine and the offerings which were placed on it.

THE DRAKE ESTATE, DEPTFORD.

Deptford, with its Royal Dockyard of former days, as the residence of John Evelyn, the distinguished diarist and author of "Sylvia," and the temporary residence of Peter the Great, is rather rich, directly and indirectly, in historical associations. W. Wickham Drake, esq., better known in the locality as Captain Drake, of Brakspear, Harefield, Uxbridge, Middlesex, suggests reminiscences of an historical character. Captain Drake may be taken as lord of the manor of the regions of New Cross and Brockley, in which, and in other parts of the parish of St. Paul, Deptford, he is the owner of the large areas of valuable building land upon which, in recent years, many wide roads and streets have been laid out, and hundreds of houses, of a superior and substantial class, have been built. Captain Drake is the successor in the occupation of Brakspear Hall of Nicholas Brakspear, or Adrian IV., the only Englishman that ever wore the papal tiara, who, if infallible in one sense, was not invulnerable, if it be true, as tradition has it, that his five years' pontificate came to an end by his being "choked by a fly." Adrian rose to the dignity he achieved from a lowly condition, and in spite of formidable obstructions to his advancement. In history he is noted for his missionary success while legate to Denmark and Norway. He was honoured by Henry II. (*temp.* 1154), to whom he issued a bull making him master of Ireland. He had the honour also of having his stirrup held at Sutrium by the Emperor Frederick I. of Germany. The pope's successor at Brakspear Hall is also a Catholic, but of a different type from that of Adrian IV. and his successors. Captain Drake has been a munificent donor to the numerous places of worship, Church of England and Dissenting, that have of late years been built upon his estate. In these good works he has had a zealous squire in his agent and surveyor, Mr. J. T. Jenkins, who has died recently, much and deeply regretted. The spacious roads and ranges of imposing buildings to the south of Lewisham high road, embracing Brockley, Manor, Wickham, Brakspear, Tressilian, and Tyrrwhit roads, with other districts, were all laid out with admirable judgment by the late Mr. Jenkins, who was highly esteemed by all who had business or social relations with him. A number of gentlemen connected with the building trades, occupying three broughams, followed his remains, although uninvited, to the Nunhead Cemetery. There have been many candidates for the vacant office of surveyor and agent for the Drake estate, and charge of the office. The experience, character, and capabilities of Mr. J. J. Jenkins, son of the deceased, pointed him out as well qualified for the post, and much satisfaction has been given by his appointment to fill it.

THE PENGE NEW VESTRY HALL.

The Penge Vestry have agreed upon the plans which have been prepared by Mr. Elkington, architect, for the new vestry-hall which is about to be erected, subject to their approval by the Metropolitan Board of Works, to whom they have been submitted. At a special meeting of the Vestry, held last week at the Parochial Offices, Anerley-road, Mr. Elkington attended, and laid his plans before the Board. The design is Italian in its architectural character. The height of the front elevation of the proposed building is 40 ft., and its width 60 ft. The hall will be at the rear of the building, and will be 60 ft. in length, by 27 ft. in width, and capable of seating 300 persons. The ground floor will contain the hall and offices; the first floor will also contain offices and committee rooms; and the upper floor will be set apart as the keeper's rooms. The building will be in Kentish rag, with Bath or Portland stone dressings. It was stated with respect to the site that it had not yet been finally decided upon. Several sites had been under consideration, and one adjoining the new Congregational church at Anerley would have been selected, but the parties could not agree as to the quantity of land required. A site near the North Surrey Schools is now before the Vestry, and will in all probability be selected.

PROJECTIONS IN BRIXTON.

For several months past there has been a dispute between the Lambeth Vestry and Mr. Philips, in respect of a number of houses and shops which Mr. Philips has been erecting in that part of Loughborough-road near its junction with the Brixton-road, and on Friday in last week the surveyor to the vestry, acting upon the instructions of the latter, brought a number of workmen upon the spot, who at once cleared away the hoarding which enclosed the buildings, and having taken forcible possession of them, commenced taking down the structures, entirely demolishing the front elevation, together with the interior walls and timbers, to a depth of about 7 ft., the distance which it is alleged Mr. Philips has encroached beyond the street-line as laid down by the Metropolitan Board of Works. The buildings are three stories in height, but from front to back not more than about 16 ft. deep, and the owner states that the small portion which now remains renders the property valueless, and altogether unfitted for shops or other business premises for which they were intended. The buildings were erected in part upon an open area in front of the former old structures, which

were taken down, and it appears that when Mr. Philips commenced to build he received notice from the local authority that he was encroaching upon the line of front in contravention of the Metropolitan Building Act, and that he must not proceed. He, however, disregarded the notice, and continued the works until the buildings were entirely up, contending that he was building on his own land, and that the local authorities had no right to interfere with him. This led to his being summoned before Mr. Ellison, the Lambeth magistrate, for an infringement of the Building Act, when he appeared by counsel, and contested the point. The magistrate had some difficulty in arriving at a decision, but after making a personal inspection of the premises he decided adversely to Mr. Philips, ruling that he had encroached upon the street frontage, and ordering him to take the buildings down. He subsequently received the usual notice under the Act, from the surveyor, but refused to comply with it, the result being that the Vestry, as representing the Metropolitan Board, have demolished the buildings as above stated. We understand that Mr. Philips, under the impression that he is in the right, and that his property has been illegally destroyed, intends to institute legal proceedings against the authorities for the recovery of damages.

A BISHOP AND ARCHÆOLOGISTS.

At a dinner of the Durham and Northumberland Archæological Society, at which fifty ladies and gentlemen sat down, at the White Hart Hotel, Hexham, Northumberland, the Rev. Canon Greenwell, of Durham, as chairman, replied to some strictures made by the Bishop of Durham on a late occasion. The Bishop, in speaking of the Durham and Northumberland Architectural and Archæological Society, had called them an "impertinent and meddlesome body," and his lordship had further directed his clergy to resist that "body" to the best of their ability, and not listen to the suggestions that might emanate from it with regard to church restoration.

"The occasion," said the Chairman, "that called forth these remarks was in connexion with the ancient church of St. Giles, in the city of Durham,—a church that in some respects required reparation and enlargement, and it was at the same time generally desired that its ancient features should not be destroyed. They heard, however, and there was no doubt the report was a true one, that it was the intention to totally destroy that ancient church. Therefore their Society took action, and, as he believed, very proper action,—action which had on former occasions been taken with like good effect. As the result of this intervention, the parishioners had resolved to preserve the best parts of the building. Their Society had hitherto exercised what influence they had for the preservation of such remains, and he hoped that, in spite of attacks made upon them, whether by canons, rectors, vicars, or even by bishops, they would not pay much attention to that, when they were perfectly satisfied that in the action they took they were perfectly right."

The speaker's observations were warmly applauded by the clergy and laymen present, and some remarks were passed on Bishop Baring's opposition to antiquarian pursuits of a like wording to his lordship's remarks on the Society in question.

SOUTH KENSINGTON AND THE DRAINS.

The following resolution was passed at a meeting of the Vestry of Kensington, held on the 26th ult.; the Rev. W. D. Maclagan, M.A., vicar, in the chair:—"That the statement made by Sir Henry Cole to the Metropolitan Board of Works, that 'typhoid fever is chronic in South Kensington,' has no foundation in fact; for no death has occurred from that cause in South Kensington during the present year, and the medical officer of health of the parish is unacquainted with any cases of illness from the same disease."

Sir H. Cole replies thus:—

"The resolution of the Kensington Vestry, affirming that typhoid fever is not chronic in Kensington, because no death has occurred during the present year, is not logical. Their medical officer of health may be unacquainted with any cases of illness from that disease, and yet they may exist.

Bad house drainage and escape of sewer gases do exist, and the Vestry may have no power to remedy them or to prevent them, and have no means of affording any information to a would-be tenant who wants it before he takes a house. The best of houses in Kensington and throughout the metropolis, and elsewhere, are exposed to diseases insidiously generated by sewer gases,—a palace as well as a cottage may be liable to them. My object is to prove the fact, and to find out some cure for it, and the Kensington Vestry ought to do their best to help me, and I have no doubt will do so in time."

EXTENSION OF THE LONDON GAS COMPANY'S WORKS.

The London Gas Company are about to carry out works of an important character in connexion with the extension of their premises at Nine Elms, and in addition to new buildings and gasometers to be erected, they have obtained the sanction of the Battersea local authorities for the construction of a bridge across Nine Elms-lane to carry a tramway which they are about to make from their wharf at Nine Elms to the works for the carriage of coals from the steamers. The height from the centre of the roadway to the underside of the bridge is not to be less than 22 ft., and the parapets of the bridge to the openings over the road, and each side, are to be close-fenced with wood to a height of not less than 6 ft. The bridge is also to be encased, and otherwise constructed and maintained, so as to render it noiseless and water-tight. In consideration of being permitted to construct this bridge over Nine Elms-lane, the company have undertaken to widen the road over Millpond Bridge, and, as far as their wharf extends, by setting back their wall from 5 ft. to 6 ft., and to pave the road as widened at their own expense.

SOME OLD HOUSES AND THEIR STORIES.

THE HOUSE IN WHICH JEREMY TAYLOR WAS BORN.

In Cambridge, in the August of 1613, there lived, in the old house we represent upon the next page, a barber named Taylor. The joyous new-found hopes with which the unhappy Puritans had regarded the death of Queen Elizabeth had died away in bitterness and despair; and so also had the gleeful prognostications of the once not less hopeful Romanists. King James had openly and definitely announced his intention of sweeping back the Atlantic. He had the Royal besom in readiness. He would be no half-king, ruling the bodies of men whose souls were governed by the Pope, and, above all, he would have no subjects who refused to obey his pets, the bishops. "No bishop," said he, "no king." Of Dissent generally he had exclaimed, "I will have none of that! I will have one doctrine, one discipline, one religion in substance and ceremony." Thus far and no farther should come the great rolling waves of religious thought and feeling, for a new Canute, who doubted neither his power nor the divinity of its origin, had planted his throne upon the wild sea-shore, oblivious of coming storm.

It was only a few months after the poor blameless Scripture-reader, Bartholomew, legate of Essex, had been burned to ashes in Smithfield as "an obstinate, contumacious and incorrigible heretic," and the horrible death of Edward Wightman, of Burton-on-Trent, for the same offence, and these terrible doings were still much talked of throughout England.

We have no clue to the Cambridge barber's opinion of these events. He was probably a worthy man, and he certainly came of a very worthy stock, and he was proud to number amongst his paternal ancestors one who had been the friend of Cranmer, Dr. Rowland Taylor, rector of Hadleigh, in Suffolk, one of the most amiable of men and best of Christians, who was cruelly burned to death by the Papists in the year 1555. The Taylors had been a family of distinction in Gloucestershire, but had "fallen into the portions of weeds and outworn faces," as the third son of this Cambridge barber, Jeremy, the most illustrious of his race, afterwards said.

The barber of that day differed widely from his modern representative. He not only shaved, but dressed wounds, drew teeth, and practised bleeding,—was, in short, both barber and surgeon. Before the Reformation the clergy had stigmatised his calling as so brutal and degrading that they refused him their benediction, in obedience to the edict of Pope Honorius III. But it was becoming far more respectable in the year we have mentioned. In ancient days, when the priests, who afterwards anathematised players, were dramatic authors, players, and managers, they also monopolised the arts of healing. But after the Pope had prohibited them from undertaking all operations which involved the shedding of blood, the functions of which they had before been proud and boastful were given over to uneducated hirelings acting under their instructions, the barbers who had tonsurated the clerical skulls. And when these skilful barbers became an independent fraternity, as surgeons, the priests, affecting to abhor their doings, denounced them as cruel, sanguinary, and brutalising, and pronounced surgeons and barbers irrevocably damned, in language as strong as that now used by those who shrink in disgust from vivisection. In process of time the barber-surgeons had become divided into two classes—those who, like the barbers of the old religious houses, were ignorant and uneducated, forming one; and others, who were specially trained and educated men, constituting the other. Taylor, the barber-surgeon of Cambridge, was amongst the latter.

When Jeremy was growing up a quiet, thoughtful child, his father determined to give him all the educational advantages he could command. He remembered well enough how, in days when the Church of Rome held sway, barber-surgeons were excluded from all academic privileges and honours, and refused admission to the University, and, blessing the change, he determined that Jeremy should have the fullest advantages of it. He himself taught his boy the rudiments of grammar and mathematics, and, when he was older, sent him to the Free Grammar School.

Those were the old days of story-telling, when the long hours of winter were wiled away in the chimney-corner by much talk of by-gone days and cherished memories. We may fancy, with every probability in favour of its being true, that we see little Jeremy, with open mouth and tearful, distended eyes, full of solemn reverence, listening to the affecting story about his martyred ancestor. How Dr. Rowland Taylor preached at a very ancient place called Hadleigh, in Suffolk, where he lived a life of exemplary virtue and piety, beloved by the poor and esteemed by all, a 'earned, wise man, a kind, good father, and an affectionate husband. How, when Queen Mary began to reign, a wicked Papist, a lawyer, named Foster, and one John Clark, on the Monday before Easter, strove to eject Dr. Taylor from his church, and place a Popish priest, to perform mass, in his place. How the brave doctor protested against this with manly firmness and much vigour of speech. How there came a terrible summons from the Lord Chancellor, Bishop of Winchester, commanding Dr. Taylor to present himself before him, and give an account of his offence; and how, despising the advice of terrified friends, who urged him to seek safety in a foreign land, he mounted his horse, and bidding his family a sad and lingering adieu, rode calmly away to face his enemies in London. Little Jeremy's face flushes as he hears of the coarse insults and harsh, cruel threats which were heaped upon the resolute Protestant by false, fierce Gardiner, who said, "I thank God I am come home again to our mother, the Catholic Church of Rome, and so I would thou shouldst do." Whereupon Dr. Taylor replied emphatically, "God forbid!" The boy's face grows more intensely sad as the story goes on to say how they sent the good man to a foul cell in the King's Bench prison, "commanding him to be straitly kept," and how after repeated examinations "he was adjudged and condemned as an heretick, and delivered to the secular power"; how his poor heartbroken wife and his son Thomas, with their servant, came weeping to his new prison in the Poultry Compter, and how on the 5th of February, 1555, his enemies conveyed him to the town of Chelmsford, in Essex, where they delivered him to the sheriff of Suffolk, who received him sorrowing, commending his goodness, piety, and learning, and most earnestly begging him to recant, and not to throw away in its prime a life so valuable to them all. The sheriff then drank to him lovingly, and so did the rest of the pitiful company, and of the wine they gave a cup to the poor doctor, to cheer his sad heart, and he, before drinking, to them said, with a mournful smile,—

"I heartily thank you for your good wishes. I have considered your counsel, and, to be plain with you, I do perceive that I have been deceived myself, and am yet like to deceive a good many in Hadleigh." And when, in their joy and hopefulness, they urged him farther, he explained the ghastly jest. He had deceived himself merely by supposing he should die at home in his bed, and be buried in Hadleigh church-yard, in the ground of which there were many worms whose long-cherished expectation of feeding on the body of such a portly man as himself he should perforce deceive.

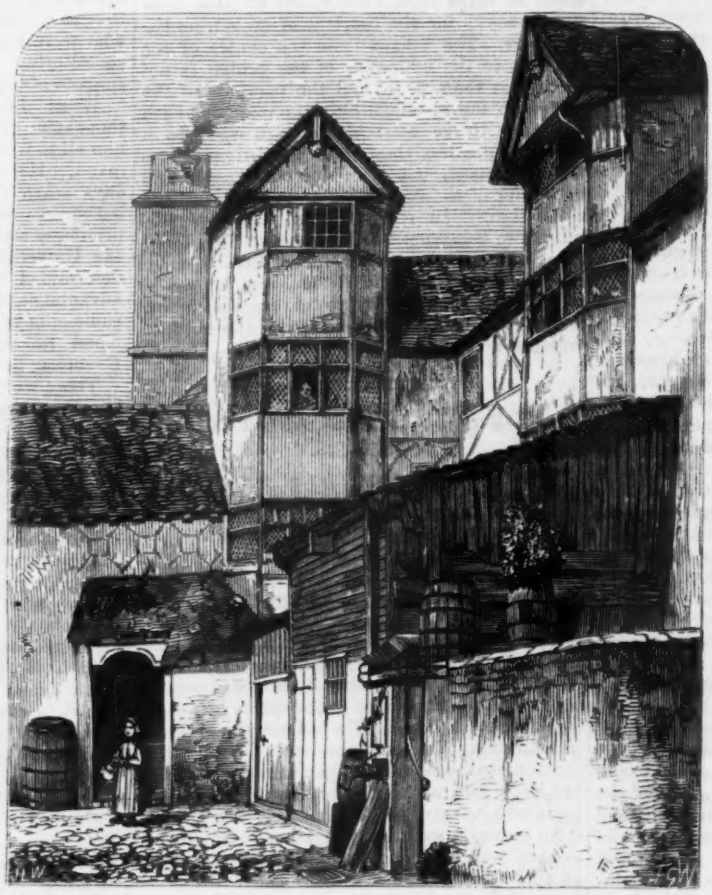
Little Jeremy's face is stricken with an expression of horror, and the tears roll down his cheeks, and the barber-surgeon's voice falters and grows low, as he tells how silent pale-faced crowds lined the streets of Hadleigh on either side when the good doctor rode forth for the last time on his way to die a cruel death. There was not a dry eye amongst them as he went by, and they "cried out lamentably, 'There goes our good shepherd, who faithfully taught us, and had a fatherly care for us. Good God, comfort and strengthen him!'" When he came to the almshouse he distributed amongst the weeping inmates all the money he had. When he reached the common the crowd was so great that he did not recognise the spot, until being told it was there he was to suffer, he alighted from his horse and said "God be thanked! I am even at home." Then little Jeremy heard how when he knelt down to pray amidst the breathless silence of that horror-stricken crowd, a poor frantic woman burst through the guards, and, despite their ill-treatment, would persist in kneeling down and praying with him, and how when stripped and placed in the tar-barrel they bound him with chains to the stake, the heart of Richard Donigham, the butcher, who had been chosen to set up the faggots about him, failed him, and he obstinately refused to do the work. The concluding horrors of that tale must have haunted the boy like a nightmare dream, as it has crept out from the nightmare pages of Fox's horrible Book of Martyrs to haunt so many since. The memory of that old house must have come back to him with this dreadful old story with which his childish mind had been so strongly impressed many a time before, in 1647, he wrote his famous discourse, "showing the unreasonableness of prescribing to other men's faith, and the iniquity of persecuting differing opinions." This has been described as "perhaps of all Taylor's works that which shows him farthest in advance of the age in which he lived, the first distinct and avowed defence of toleration which had been ventured on in England, perhaps in Christendom." When he wrote thus, Jeremy Taylor had seen the kingdom of Great Britain convulsed by one of the most terrible of civil wars. The storm had arisen, and the great waves which the Scottish Canute had so arrogantly threatened with his sceptre had overturned the throne. He had seen religion made the vehicle and the excuse for indulgence in the worst of evil passions. The Puritans had cried, "Cursed be he that keepeth back his sword from blood!" and, with bigotry and ferocity as blind and savage as that which had condemned his ancestor to the stake, had asserted that "it is better to see people wallowing in their blood than embracing idolatry and superstition."

We cannot realise what the appeals of Jeremy Taylor for Christian compassion and long suffering patience were to our forefathers who had witnessed the scenes whereby his heart was so powerfully moved and his mind so strongly inspired. His arguments against the damnatory portions of human creeds in favour of a palpably divine doctrine of love and mercy were new to them; but they had wept and made moan over miseries; had shrunk in disgust and horror from deeds of blood and torture, which to us have the weariness of oft-told tales, and are removed by distance of time far beyond our active sympathies or fears. And the fruit our forefathers reaped from his teaching, and the seed they put in the ground for our benefit, may have owed much to that story of Rowland Taylor's martyrdom to which Jeremy listened so often when a little child in the old house of our sketch.

That house has other stories connecting it with our hero of the seventeenth century. It was still his home when after being educated *per decennium* at the grammar school founded at Cambridge by Dr. Stephen Perse, he passed at the age of fifteen through the Gate of Humility to Gonville and Caius College as a *pauper scholaris* or sizar on the 18th of August, 1626. Seven years after he was still in Cambridge, and obtained a Perse Fellowship, receiving a stipend which ended in 1636, when he had left Cambridge for Oxford, where he was very fortunate, securing the friendship of Archbishop Laud, who made him his private chaplain, acquiring a fellowship of All Souls' College, and becoming rector of Uppingham, in Rutlandshire.

In 1639 he abandoned the fellowship for the privilege of marrying the sister of a friend who had been his pupil in Cambridge (Miss Phœbe Laudisdale), who bore him three sons in as many years, and in the last year died. Then the great storm of civil war was raging fiercely, and it became every true man's duty to stand at any risk honestly, fearlessly, and openly, by his convictions. Jeremy Taylor's chosen cause was that of the king, and as chaplain in ordinary to Charles I., he attended that monarch in some of his campaigns, writing at intervals the while in defence of the English Church. Drifting to and fro in the wild turmoil of blood and strife, he soon after found himself in Wales, where he met and loved a lady named Bridges, whom common report described as a natural daughter of Charles I. There he thought he would escape the fierce storm, and cast anchor in a little boat in which he hoped to ride it out in calm security. But in a battle fought before the castle of Cardigan, it was his fortune to be taken prisoner by the Parliamentary army. Being soon after released, he hurried back to his lady love, whom he married, hoping to enjoy rest and quietness in some humble capacity. The Earl of Carbery, of Golden Grove, Carmarthenshire, befriended him, and by the exercise of his ministry, and the aid of his wife's income with that derived from keeping a school in conjunction with William Nicholson, who was afterwards Bishop of Gloucester, and William Wyatt, who subsequently became prebendary of Lincoln, he supported himself, his wife, and his three sons. In August, 1647, Taylor had a last interview with his royal master, and received from him in token of regard his watch with a few pearls and rubies. This was the year in which the work we have already alluded to as a plea for tolerance in religion was published. In 1650 Taylor exchanged his residence in Wales for Ireland, his passport being granted to him by Cromwell himself, who sent therewith many expressions of personal esteem and kindness. To this step he was instigated by Lord Conway, who gave him an asylum on his estate at Portmore, near Lisburne, in the county of Down, and desired him to take charge of the spiritual interests of his tenantry. Taylor often used to allude to this as a period of tranquil happiness.

In 1654 some fervent unguarded expressions uttered by Taylor, prejudicial to the Commonwealth, resulted in his being made a prisoner, and committed to Chepstow Castle. Soon after his liberation he removed to London to officiate as minister to a small congregation of Loyalists. In 1658 he accepted an alternate lectureship in the town of Lisburne, returning to the north-eastern extremity of Ireland. From Lisburne he removed to Portmore, where he found a safe retreat during the interregnum, and brought to a conclusion another of the various great works he had up to that time produced — the "Ductor Dubitantiam." When the Stuarts came back to the throne he was amongst those whose signatures were affixed to that memorable "Declaration of the Nobility and Gentry," which pledged the coming government —alas! so vainly—to bury "all rancour and former animosities."



Birth-place of Jeremy Taylor; in the Petty Cury, Cambridge.

Almost immediately after the accession of Charles II. Jeremy Taylor was presented to the bishopric of Down and Connor, to which was afterwards annexed that of Dromore, "on account of his virtue, wisdom, and industry." Honours and preferments now flowed in upon him thick and fast. He was soon after made Vice-Chancellor of the University of Dublin, and a member of the Privy Council. The composition of several polemical and practical treatises, together with his diocesan duties, seem to have filled up the concluding years of his existence. To the last his thoughts went lovingly back to his old college home and friends in Cambridge; and when he had the deanery of Armagh at his disposal it was offered to his old friend, Francis Marsh, of Caius College, and his own dean was another of his early friends in Cambridge.

On Aldham Common, on the spot where Jeremy Taylor's brave ancestor suffered martyrdom, was placed a stone, on which, roughly inscribed, were the lines,—

"Anno 1555,
Dr. Taylor, for defending what was good,
In this place shed his blood;"

and the volumes which were the life-work of his great descendant are the records of a spirit as earnest, indomitable, and brave; records which will be read with glowing hearts by thousands, when the martyr's rude memorial-stone has been forgotten for ages, and no man knows the place on which it stood.

Jeremy Taylor died on the 13th of August, in the year 1667. Coleridge spoke of him as "a spirit .... burning with Christian love; a man constitutionally overflowing with pleasurable kindliness, who scarcely, even in a casual illustration, introduces the image of a woman, child, or bird, but he embalms the thought with so rich a tenderness as makes the very words seem beauties and fragments of poetry from a Euripides or Simonides."

South Kensington Museum.—The attendance keeps up well. The visitors during the week ending 29th July, 1876, numbered 29,674, the average of the corresponding week in former years being 16,544.

CHESTER CATHEDRAL: NEW ORGAN GALLERY AND CASE, NORTH TRANSEPT.—SIR GILBERT SCOTT, R.A., ARCHITECT.

[See p. 740.

CHESTER CATHEDRAL: NEW ORGAN GALLERY AND CASE, NORTH TRANSEPT.—Sir Gilbert Scott, R.A., Architect. [See p. 749.

ROMAN SOMERSET, WITH SPECIAL REFERENCE TO RECENT DISCOVERIES IN BATH.*

It will be remembered by some here present that when the Somerset Archæological and Natural History Society met in Bath, on the 21st of September, 1862, the fourth year after its foundation, I had the honour to give a brief account of the Roman remains that were preserved in the Museum of the Literary and Scientific Institution. The paper read on that occasion was published in the proceedings, and the interest taken in the subject led to the expansion of it into a quarto volume, published twelve years afterwards (1864). Twelve years have since elapsed, and in the course of those years something has been added to the information thus brought together. I purpose, therefore, now to supply a notice of what has been acquired; but this notice must necessarily be brief, and can only indicate what may be done by careful observation and collection and preservation of remains when found, and may serve to show how necessary it is to note down every remnant of antiquity which may come to light. If another edition of "Aqua Solis" were put forth, it would contain much matter that has accumulated, and rectify some errors which in years past it was impossible to avoid. The study of Roman remains, and especially of inscriptions, has, within the last fifteen years received increased attention, and a great impetus has been given to it by the publication of Dr. McCaul's "Britanno-Roman Inscriptions, with Critical Notes," in 1863, in which Somerset inscriptions form an important part,—by the publication of Bruce's "Lapidarium Septentrionale," or inscriptions found in the line of the great northern barrier, or in the neighbourhood of it; but the chiefest and most important part is due to German industry, and that is the seventh volume of the "Corpus Inscriptionum Latinarum," put forth by the Academy of Letters at Berlin. This volume contains all the inscriptions found in Britain, brought together, and edited by Professor Hübner, under the title "Inscriptones Britanniæ Latinæ" (Berlin, 1873, Reimer). In this very scholar-like work Bath has received due attention, and the readings of the inscriptions are very accurately given, while the comments upon them are exceedingly valuable. Professor Hübner has paid two visits to England, and the Roman remains of Bath were on one occasion very carefully examined, when I had the pleasure of seeing and conversing with him, and have since been in frequent communication. He has availed himself of all the authorities who have written of British-Roman remains, consulting them with great care, always acknowledging their use, and pointing out wherever they have fallen into any error. The first subject to be noticed is the ancient name of Roman Bath, which has always been a fruitful subject of discussion. Is it *Aquæ Solis* or *Aquæ Sulis?* Professor Hübner decides in favour of the latter, on account of the altars bearing inscriptions to the Dea Sul, but acknowledges that there is good authority for Aquæ Solis. To myself it appears a point very difficult of solution, for Sul in the ancient Gaulish language seems to have been synonymous with Sol. Sul was the eye of the world, the universal soul, or soul of the universe. The word "soul" is from the Saxon, but in some of the cognate languages it approaches very near the word Sul. The word soul expresses inward illumination. And if you note, Sul is connected with Minerva on two of the Bath altars. Minerva, the goddess of wisdom, is coupled with Sul, the goddess of illumination. Leaving, however, our hearers to select whichever name they would like, I pass on to a point of not less importance,—the rank held by Bath among the Roman cities of Britain. Aquæ Solis, or Aquæ Sulis, is distinguished from another *Aquæ*, the position of which, though generally believed to be Buxton in Derbyshire, has only lately been confirmed by lapidary evidence. Some years ago (1862) a Roman "miliaria," or milestone, was discovered in the immediate neighbourhood of Buxton. This gives the name of one of the Roman stations mentioned by the Chorographer Ravennas as the next to "Aquæ," and at the same time the distance between the two places is given, and so we are enabled to fix the position of "Aquæ" at Buxton, where the remains of Roman baths have been found (see *Archæol. Journal*, vol. xxxiii. p. 54). We have, therefore, the remains of two watering-places famous in Roman as well as in modern times, "Aquæ," and "Aquæ Solis or Sulis"; but our Somersetshire city appears to have been most famous, according to the account of Solinus, and judging from the remains that still exist. Indeed, if I may quote the words of Professor Hübner, "omnis vero regio illa vertigiis vitæ Romanæ abundat: ut apparent loca etiam hodie amœnitate cœli non minus quam aquarum salubritate clara inde ab initiis dominationis Romanæ precipue culta esse." I hope this testimony of a German to the charm of the climate of Bath, as well as to the springs and the Roman remains, will have due weight with some who dwell here, and who, it is to be feared, little regard the privileges of place, country, and clime. We see that Professor Hübner regards the antiquities found in Bath for the most part as of early date, and this is certainly borne out by the discovery of the "Lamina," and pigs of Roman lead, bearing the Imperial stamp, in the district of Mendip, one as early as A.D. 44-48, found at Blagdon, and the latest found at Charterhouse (in 1874), being of the date C, A.D., 166. From the coming of Vespasian into this island, in the time of the Emperor Claudius, to the end of the second century, we may probably date the chief remains found in this city. Yet Bath itself does not appear to have been a military station. There was a military station at Combe Down, as the inscription found there in 1854 clearly proves, but Bath itself was a place of resort for recovery of health in Roman times as well as at present. Professor Hübner observes, "milites ex universa provincia huc convenisse valetudinis recuperandæ causa consentaneum est: unde non mirabimur titulos aut votivos aut sepulcrales hic repertos esse legionariorum legionis ii adjutricis, ii Augustæ, vi victricis, xx valeriæ victricis, item equites Hispani in ala Vettoniana militantis." We have evidence of soldiers of four legions coming hither, and of Spanish cavalry, but we have a total absence of Roman tile or brick bearing the stamp of any legion. These remains are abundant at Caerleon, Chester, York, and elsewhere, and would have been found in Bath had there been any stationary camp. There are no traces either of a Roman municipality: the decurion or magistrate, whose monument was found here, belonged to Gloucester (colonia Glevum), not to Bath. The discovery in 1854 of the inscribed stone at Combe Down established the fact that "principia" or Roman "officers' quarters" were situated there, and the remains since found of columns, coins, pottery, and glass, show that dwellings existed there, though no traces of a fortified camp have been found, yet such may have been obliterated by quarrying, as all the grounds around have been much disturbed, and a large portion of land built upon. There are some traces of a fortified camp on Berewyck-hill, near where the fosse road entered Bath, but here also the operation of quarrying renders it very difficult to trace the entrenchments. The sculptures once seen in the ancient walls of the city, but now lost, which are recorded by Leland, and drawn and published by Dr. Guidott, have been recently confirmed by the discovery of drawings also made of them by Dingley, in the time of Charles II., whose MS. has been published by the Camden Society (1867). There is an additional sculpture given in Dingley's MS. of a figure bearing a palm-branch in the right hand, and a wand in the left. The authority for these sculptures has sometimes been doubted, on account of the representations given in Guidott's work being somewhat un-Roman. In the pen-and-ink sketches made by Dingley, the Roman characteristics are better preserved, and no doubt is left of the authenticity of the sculptures. It is much to be regretted that all these stones have perished. They had been built into the Mediæval walls, as relics of a power that had passed away, but alas! in the removal of the walls in later times no care was taken to preserve them. In the autumn of 1867 and spring of 1868 the old White Hart hotel was removed to give place to the present Pump-room hotel. In digging out the foundations, Roman remains were found at a depth of 16 ft. nearly opposite to the Pump-room, and on the opposite side of Stall-street was found a basement of concrete 24 ft. 3 in. east and west by 20 ft. 3 in. north and south. Attached to this were large stones laid as a foundation. At a distance of 15 ft. west the foundations of walls were laid bare, and 39 ft. still further west foundations of other walls. These seemed to have formed an ambulatory or covered walk round the building, the two lines of parallel wall being 10 ft. 6 in. apart. The entire width of the court in which this building had stood was 112 ft., but the foundations of the wall 15 ft. from the mass of concrete seemed to show that it had been surrounded by a portico or colonnade. Happily, an accurate plan of these remains was made, and notes taken by Mr. Irvine, and an account sent to the *Archæological Journal*, March 5th, 1868. Many interesting remains were found above these foundations, especially a fine piece of embossed glass, several coins, and some portions of sheet window glass. This is found in abundance all over the ancient city when the Roman level is reached (see "Notes by Mr. Irvine on the Remains of the Roman Temple and Entrance"). The removal of the old White Hart led to the confirmation of an idea which had been current previously that after the Roman evacuation of the city it had been abandoned and allowed to fall into ruin. The site was found to be covered up with mud, vegetable remains, and drift wood, the deposit being in places almost converted into peat. This is the description of Mr. Moore, who carefully examined the site during the process of clearing away the foundations for the new Pump-room hotel. Mr. Earle, in vol. ii. of the Proceedings of the Bath Field Club, has given a very interesting paper on "An Ancient Saxon Poem of a City in Ruins," supposed to be Bath (read 15th March, 1871). This poem is from an old Saxon book preserved in the Chapter Library at Exeter. The description well applies to Bath, and can indeed belong to no other place, and this is a confirmation of the fact, that the Roman city was probably abandoned for a century or more after the battle of Dyrham, A.D. 577. We are many of us acquainted with the work of Samuel Lysons, published in 1802, containing drawings of the chief Roman remains found in Bath, and entitled "Remains of Two Temples and other Antiquities discovered at Bath." He has attempted the restoration of two temples from the fragments preserved. Since the time of this publication others have come to light, and, by the aid of these, Mr. Irvine, who was some time resident here (having the oversight of the works needful for the restoration of the Abbey Church), has given a more detailed restoration of the Roman Temple in the Proceedings of the Archæological Association for the year 1873. He has with great care and diligence succeeded in placing every fragment in its proper location, and has given two architectural drawings of the temple and another building in their original condition. We have the pediment, the frieze, the entablature, and the columns all reproduced in scale, and the places assigned to the sculptures still extant; also he has found out the probable position of the stone containing the sculptures of Hercules and Bacchus. He supposes that the building called by Mr. Lysons the smaller temple was the entrance to the Roman baths, and in the proposed frontage which he gives, he finds the true position for the sculptures of the "Four Seasons," and also for the inscription, the fragments of which are placed in the passage of the Literary and Scientific Institution, together with the conjectural restoration. "This building," he says, "was erected probably later than the temple," and as part of the Roman baths, and he has computed the area covered by them at a length of 500 ft. by a depth of 100 ft. I need not say how much the labours of Mr. Irvine have tended to elucidate the Roman vestiges still remaining in Bath. I have mentioned the inscription in the passage of the Institution, which has called forth the learning of eminent men in conjecturally filling up the missing spaces; Mr. Lysons gives a conjectural restoration, and for further conjectures I would refer to "Aquæ Solis." Professor Hübner is the last authority who has put forth an opinion, and his conjectural restoration is well worth our attention. He says,—"In Bath, anno 1790, in Stall-street, detectæ sunt reliquiæ templi operis tectonici optimi, quæ servantur in museo. Litteræ sunt optimæ et alte incisæ sæculi puto secundi." He supposes the restoration of the temple of Sul-Minerva to be the work of two priests of that goddess. If this restoration of the temple was carried out in the second century, as Professor Hübner seems to think from the form and execution of the lettering, "Litteræ sunt optimæ et alte incisa sæculi puto secundi," it is another proof of the early settlement of Bath as a Roman town, for the inscription commemorates a restoration. Most of the altars hitherto found in Bath are dedicated to the goddess Sul, Sul-Minerva, and the Sulivæ. One is dedicated to Mars Lucetius and

* By the Rev. Prebendary Scarth. Read before the Somersetshire Archæological Society on the 19th ult.

Nemetona, but there were found in 1870 in removing a portion of the buildings of the Bath market, adjoining the Guildhall, two portions of an altar dedicated to the "Genius Loci." The inscription had consisted of six lines, the first and last alone being distinctly legible. The other portions can only be restored conjecturally. The altar seems to have been erected in the time of the Emperor Hadrian, probably from A.D. 119 to 135. This is an addition made to the city collection of remains for which we have to thank Mr. C. E. Davis, the city architect. An altar bearing the same inscription, DEO GENIO LOCI was found at York in 1875, in making the new railway station. It is a curious inference to be drawn from the discovery of this altar dedicated to the "Genius Loci," that the goddess Sul seems to have had other and distinct attributes. Although the tutelary deity presiding over the springs, she was not the "Genius Loci," unless it be supposed that the "Genius Loci" was only another title of the goddess Sul. "Not only the individual," says Professor Döllinger, "but each and every place had its genius. There were countless genii of places." "Why talk to me," says Prudentius, "of the genius of Rome, when your wont is to ascribe a genius of their own to doors, houses, baths, and stables, and in every quarter of the town, and all places, you feign thousands of genii as existing, so that no corner is without its own ghost" (Prud. adv. Symmach, 11, 444). "No place," says Servius, "is without a genius, generally manifesting itself in a serpent. The people, the curiæ, the centuries, the senate, the army, the different burgher companies, each and all had their genius. There were even genii of particular deities" (see Döllinger's "Gentile and Jew," vol. 11, p. 62). We may, therefore, infer that this genius had presided over the locality where the altar was found, or over some company. What a medley of belief do these remains open out before us! The goddess Sul or Sul-Minerva seems to have presided over the springs, and her tutelary guardianship to have rested over them. Thus it was at the head of the spring of the hot bath, near to the site of St. John's Hospital, that the small elegant-shaped altar dedicated to the DEAE SVLIMINERVAE, by SOLINVS MATVRI FIL, was found, and with it were found many coins deposited there, no doubt as votive offerings. At the source of the Seine, which rises near Besançon, around the principal spring were found the foundations of a Roman temple, with bath, statues, and ex-voto offerings, as arms, legs, hands, carved in stone, also a vase containing votive offerings in bronze and silver, and as many as 830 coins, reaching from Augustus to Magnus Maximus. The vase was inscribed,—

DEAE SEQVANAE RVFVS DONAVIT.

A votive altar also, dedicated by Flavius or Flavianus,—

AVG SAC DEAE SEQ,

"To the August and Sacred Goddess Sequana,"

PRO SAL[VTI] NEP. SVI,

for the health of his nephew. As late as February, 1875, there were found at Bourbonne-les-Bains, department Haute-Marne, France, in cleaning the reservoir of thermal waters, above 4,000 bronze coins or medals, and a few gold coins. These were, no doubt, *ex voto* offerings to the divinity of the spring, also small statuettes, beautifully wrought, and a stone pillar bearing inscriptions,—

BORVONI ET DAMONÆ, BORMONIAE DAMONAE
APOLLINI BORVONI ET DAMONÆ.

We have here the local deity Borvo dignified with the prefix of APOLLO. Apollo precedes Borvo, but at Bath Sul precedes Minerva; the barbarous goddess precedes the Roman; we never find *Minerva-Sul*. Borvo, however, was happily united to a wife, or female companion, called Damona; but we do not find the goddess Sul, or Sul Minerva, to have been blessed with a husband. I am, therefore, disposed to regard *Sul* as only another form of *Sol*, and as combining the attributes of male and female. It is interesting to find, in different lands, remains of the same grateful custom of making votive offerings for recovery of health. The altar in the Literary Institution dedicated to the DEAE SVLI by AVF LEMNVS PRO SALVTE ET INCOLVMITATE AVF MAXIMI, whose freed man he was, is a very pleasing record of gratitude. I cannot but look upon the noble Mineral Water Hospital in this city, open to all the sick poor of the British Empire, where the cases of sickness can receive benefit from the healing springs, as a fitting monument,—a votive altar,—on behalf of a Christian people, a grand evidence of Christian love and charity, in obedience to the divine command that "he who loveth God loveth his brother also." Among the amended readings of the Bath inscriptions, where the lettering upon the stone is doubtful, made by Professor Hübner, is one which deserves attention. In the Sydney Gardens was found the monumental stone to the priest of the goddess Sul, C. CALPVRNIVS, who died at the age of 75. The memorial is erected to him by his wife TRIFOSA, but the letters following this name are much obliterated. Professor Hübner has, however, given what appears to be the true reading, viz., "LIB(ERTA) et conjugæ,"—"freed woman" who had become his wife, and probably nursed him in his good old age, and been comfortably provided for by him, or she would not have erected the memorial stone, for monumental stones were generally tokens that means were provided for their erection. Thus in the mutilated inscription (probably of the first century) to a soldier of the 20th legion, who had served his time, and was probably of Nicomedia, the monumental stone is erected by G. TIBERINVS, "heres," his heir. To the Romans belong pre-eminently the credit of inventing the will. It is doubtful whether a power of testation was known to any original society except the Romans. "Rudimentary forms of it," says Maine, in his treatise on ancient law, p. 194, "occur here and there, but most of them are not exempt from suspicion of Roman origin. The Athenian will was no doubt indigenous, but it was only an inchoate testament. Similarly the rudimentary testament which the Rabbinical law of the Jews provides for has been attributed to the Romans. The original institutions of the Jews have provided nowhere for the privilege of testatorship." In addition to the memorial stone to the priest of "Sul" found in the Sydney Gardens, other interments have since been found, but no inscriptions. A stone coffin, mentioned in "Aquæ Solis," p. 101, and since then in February, 1866, when a pit for gravel was opened near the boundary fence, which separates the college playground from the gardens, many fragments of black earthenware and pottery, together with two flint arrow-heads, were found; ashes and burnt matter were also found, and stones reddened by the action of fire. During the month of August the same year another gravel-pit was opened in the same ground, and at the depth of 10 ft. below the surface, two stone coffins lying side by side were discovered. The one contained a skeleton supposed to be that of a male, and the other the head of a horse. The head of a horse interred in a stone box or cist was also found at Combe Down, when the inscription there was discovered. Many interments both in sepulchral urns and in stone coffins have been found at the foot of Bathwick-hill in preparing sites for villas, and this leads to the belief that this south side of the river was used as a place of interment, and that probably a Roman road here passed up the hill, or along the river side. Roman interments have been found on every side of Bath, especially where the lines of ancient road passed out of the city. In digging the foundation of the Church of St. Andrew, beyond Catherine-place, a stone coffin was found in 1870, also the remains of several interments. The traces of the Roman road which passed out of the city in the direction of Bitton were also found. This line of road has been called the Via Julia, and came from Marlbro', the Roman Cunetio, and passing down Bathford-hill, and through Batheaston into Bath, passed out by way of Weston to Bitton, and on to Sea Mills and the Severn, at Aust. An account of this road will be found in vol. i. of the Proceedings of the Bath Field Club. But the most important Roman road entering Bath and traversing Somerset was the Foss-road, coming from the sea coast at Seaton, passing through Ischalis, Ilchester, on towards Shepton Mallet, where it crossed another great line of Roman road which traversed the Mendip district, and passing by Camerton, entered Bath by Holloway, and left the city again by way of Walcot-street and Batheaston, and passing up Batheaston-hill in the direction of Colerne went on in a direct line to Cirencester. Along the course of this road the sites of many villas have been traced, and the pavements and hypocausts laid bare, as at Wellow, Camerton, Newton, St. Loe, Combe Down, Batheaston, Colerne, South Wraxall, and Langridge. These are enumerated in "Aquæ Solis," p. 112 and following, — but since the publication of the work another has been opened near Tracy Park, in October, 1865, under the direction of the Bath Field Club, and a full account of this is given in the first volume of their proceedings. Somersetshire is rich in the remains of Roman villas, and these lie chiefly in the direction of the great Roman roads. There are three principal lines of Roman road in Somerset, the *Foss*, the *Via Julia*, and what has been called the *Via ad Axium* which passed from Sarum, near Salisbury, to Shepton Mallet, where Roman pottery kilns have been discovered, to the mineral district of the Mendip Hills, where many vestiges of Roman mining are now being unearthed. The vestiges of Roman mining are here very abundant, and portions of inscriptions have been found cut in stone, as well as stamped in leaden lamina. These works go back to the time of Claudius. Scattered throughout the proceedings of this Society will be found notices of the tesselated pavements which have been opened in various parts of the country. It would be too long to attempt more than to mention those found at Pitney, at Chard, at Coker, at Ilchester, at Somerton, but it is time that some steps were taken to collect and put together details of Roman Somerset, the roads, villas, Roman stations, coins, pottery, inscriptions, accompanied by a map noting the exact position where such relics have been found. This Society might devote something from its resources for the publication of such an account, and this should be done throughout every English county. Private efforts have accomplished much, but these ought to be seconded by public spirit, and the burden lightened from those who, if partially assisted, might accomplish much in the illustration of their country's antiquities.

ON THE CONSTRUCTION AND MAINTENANCE OF THE PUBLIC HIGHWAYS.*

THE construction and maintenance of highways must form at all times a most important work of sanitary authorities, not only because of the increased comfort to the community of well-kept roads, but because of the increased cost of locomotion and cleansing and discomfort of badly-maintained roads. Unfortunately, the construction and maintenance of highways is a subject that few surveyors of the present day give much attention to. It is popularly supposed that the mere covering of a road with broken stone is sufficient to form a good and permanent highway; this being the view taken by a large number of those who have the control over roads, the consequence is that in many cases throughout the kingdom the roads are in a bad state of repair, and cost a larger amount annually than is necessary for cleansing and watering. Roads, too, are frequently maintained by committees, who have but a slight and imperfect knowledge of what their duties are; and I take it to be the duty of every surveyor of highways not only to advise his committee of the quantities of materials that are required to maintain these highways under their direction, but further to inform them of the best known means of maintaining the roads in a maximum efficiency at a minimum cost. Thus the surveyor secures the valuable aid of disinterested persons living at all parts of the district, in supervising the repairs, and indeed, without a large and expensive staff, with anything like a long mileage town roads cannot be kept as they should be unless the surveyor is thus assisted. I therefore propose in this report, as briefly as possible, to point out the cardinal points to be observed in the construction and maintenance of roads in Urban Districts such as Derby.

The direction of roads is usually determined by private capitalists, but it should, in my opinion, form the subject of legislative enactment, that all new roads should be laid out in certain directions, especially in rapidly increasing towns; for were a preconcerted plan to be carried out piecemeal by owners of property, not only would a large amount of money be saved, but public convenience would be served in a much greater degree than it is at present, where every owner of property makes roads to suit the fancy of his surveyor or himself, acting frequently in ignorance, when he would only be too glad to follow out a plan which, in nine cases out of ten, would cost him no more money, become as available for his own purposes, and be of much greater convenience to the public

* By Mr. E. B. Ellice-Clark, C.E., Borough Surveyor of Derby, read at a recent meeting of the Association of Sanitary Engineers, already referred to.

at large. I am therefore strongly of opinion that where new roads are projected the sanitary authority should exercise their discretion not only as to the constructive portions of the roads, but also as to their direction; for we must not forget that all these new roads ultimately form part of that network of highways which is the only means of communication from one part of the district to another, and where roads are judiciously laid out at first, the stoppage of one street like South-street, by the Great Northern Railway, would be a matter of slight instead of great and permanent inconvenience.

The next thing to be considered is the gradients of roads. All roads should be as nearly level as possible. To illustrate this, I may cite the instance of Bridge-gate. Suppose from its lowest point to the summit at King-street we had a perfectly level roadway instead of having a gradient of 1 in 32, as we have, every horse drawing a load would be able to draw one quarter more than it does now; and as we have 1,268 carts passing up this street daily, one half carrying 1¼ ton each, 238 more tons could be taken to and from the town with the same amount of horse-hire each day. Then, again, roads with steep gradients cost fully one-third more to repair than flat roads. In the case of Bridge Gate it is three times more than London-road; consequently it is difficult to form an idea, without going into detail, of the increased cost to the community of steep roads, which should in all cases, where practicable, be avoided, and any extra expense in making urban roads level at the first outlay will fully repay the authorities by the ultimate diminished cost of cleansing and repairing, to say nothing of the saving to the community by the increased weight that can be drawn with the same amount of horse expenditure. One of the most important matters in forming roads is the cross section, *i.e.*, the shape from kerb to kerb. The prevailing profile now adopted is that of an elliptical projection, high in the centre, and sloping gradually to the channels,—a section which is, in my opinion, the reverse of what it should be for roads sufficiently wide for four vehicles to pass abreast; and no main roads should be made a less width than this. My objections to the existing section for such roads as Friar-gate or London-road are, that if the road is made sufficiently flat for carriages to run easily over all parts of the roadway, the gradient is not sufficient to carry away the water which lies in the centre, and renders the crown rotten. In suburban roads the traffic is nearly always in the centre, consequently they are worn down most unevenly; this is manifestly a wrong result, as roads should be of such sections as no preference would be shown to any portion of their surfaces.

The prevailing section of roadways comes about by engineers following the footsteps of Telford, who constructed all his roads to the elliptical section; but the conditions existing in his time are most dissimilar to the conditions and exigencies of our day. Telford's roads were highways from city to city, having few vehicles running on them. The great objects then were not what they are now, to present over the entire area the hardest and least slippery surface, to give the firmest foothold to horses, and to stand the daily wear and tear of thousands of vehicles heavily laden, but to keep the roads dry and sufficiently hard in their centres to bear the traffic of a few vehicles, rarely exceeding a hundred daily; the elliptical section suited those times and requirements; vehicles rarely meeting, consequently the inconvenience arising from the steep sides of roads was not felt, nor was the centre worn away, as the traffic was trifling. My own opinion is that all main roads should be made sufficiently wide for four vehicles to pass abreast, and where the traffic is considerable, and the rainfall is such as to necessitate pitched channels and storm-water sewers, the channels should be in the centre instead of at the sides, thus obviating the tendency of vehicles to slide down the sides towards the kerb; the slopes to the centre channels from the kerbs need only be very slight, especially where the hard metal is used to coat the surface, in which cases a maximum of 1 in 40 might be adopted. The advantages claimed for the section of road with channel in the centre are :—

1st. In the case of a macadamised road with gullies and pitched channels, half the cost of both these serious items would be saved.

2nd. The gullies need not be trapped, but be left open as sewer ventilators.*

3rd. Carriages would use all parts of the road surface except the channel, producing a uniform wear.

4th. The "slop" which is now swept to the sides of the road, thrown up to the carts, frequently bespattering pedestrians, would be swept to the channel in the centre, and be the farthest possible distance attainable away from the foot-passengers and shops.

5th. In the case of a crowded thoroughfare, the channel would divide the up and down traffic without the aid of police.

The objections that have been raised to this section of roadway are :—

1st. The carriages slide down towards each other, especially in frosty weather.

2nd. A large stream of water washes away the metal at the channel.]

My answers to these are, that the slope of the road to the centre will only be slight, just sufficient to carry away the water, and not sufficient to cause the tendency of vehicles to slide to the centre to have any foundation in practice.

The second objection is overcome in the case of sewered streets with frequent gullies, for the water disappears down these before it has assumed sufficient volume to become a stream having velocity enough to wash away the metal.

I am quite aware that this section of roadway is contrary to all the practices and prejudices of surveyors in this country; but I believe, if tried, we shall obtain better roads at less cost both in construction and maintenance, better lighting, and a more effectual mode of ventilating our sewers, all objects of paramount importance to Sanitary Authorities.

The next important matter in connexion with roads is the nature of the materials of which they are formed and coated. The ordinary mode now in practice is to lay in a bottom of hard core, rammel, foundry cinder, or some such kind of material, to a depth varying from 9 in. to 1 ft., without any uniformity as to size. The practice of the first road-makers in the world, viz., the Romans, and also the great road-makers at the commencement of the present century, was to lay courses of large-sized stones by hand on the road-bed to form a foundation, which, as a matter of fact, was the actual road, the next coating of broken stones being merely a covering to take the traffic wear, and prevent the road proper beneath from being worn into holes. The advantages of this method of forming a road are, that as it has to sustain great pressure from heavy loads and "violent percussion," it forms a solid foundation which is necessary to resist these. In the case where the tyres of the wheels are narrow and the loads heavy, the modern system of roadmaking is most pernicious. Under the old system, this kind of traffic* is dealt with much more economically, as the weight is distributed over a much larger area, thus preventing clay and other soft material from "spewing" up when the road has become out of repair and soddened with wet. We have an excellent example (?) of this in the Mansfield-road, near Little Chester Church, where the surface has been raised very high from constant metalling on a bad bottom, but which no amount of metal short of re-making will form a good road, and where, in spite of frequent repair and scavenging, the road is never in good order.

Another great advantage of forming a rough pavement like the one I speak of is that it forms a drain for the water, which finds its way through the top coating of broken stone,—an especial advantage on a clayey soil like that of Derby. A road formed in this manner will cost but a little more than if formed by the prevailing mode, as stone of a much more inferior quality and less costly character may be used; it will bear a much greater amount of weight; the bottom will not be influenced by the most severe frosts and rapid thaws, and a less quantity of broken stone may be used than if the bottom is of small stone or hard core thrown down at random. In addition, the covering of broken granite or other hard stone will last much longer on a foundation of this sort, and the expense of repairing and scavenging will be considerably less. Sir John Macneil, from actual experience, computes the saving by forming a road like this at least one-third the expense of repairs annually, and I believe this to be within the mark.

I should like to say a few words on the use of small round stones (boulders) used on some outlying roads, and state my objections thereto. These small stones, unbroken, being pressed by vehicles against each other, find no "bed" when they come into contact. By such pressure they move, and thus form hills and depressions on the surface; and the joints being large, gaping in fact when compared with those of cubical stones, a large portion of the exposed surface joints becomes filled with horse-dung and mud, which must give an offensive effluvium, and be prejudicial to health. The illustration of McAdam to a Parliamentary Committee, when explaining the advantages of using cubical instead of spherical stones, is conclusive: he had two basins, one filled with marbles of broken stone, the other with spherical stones, and requested the members of the committee to thrust their clenched hands into each basin. They thus had demonstrated to them that they could plunge their hands to the bottom of the latter basin with ease, and the marbles "spewed" up, while the greater the pressure in the other basin, the tighter and more compact were the contents; and thus it is on a larger scale with roads. I therefore recommend you to discontinue the use of all unbroken stone, however small.

I have hitherto been speaking of suburban roads, and if I have digressed somewhat from the original intent of this report, it has been an attempt to show that a large saving in cost, and a greater efficiency in construction and maintenance, may be obtained in the future on those roads where the traffic is not so great as to require paving on the surface. Let me now deal with roads where the nature of the traffic is such as precludes the use of a broken stone surface. Premising that it is difficult to determine where Macadamising should end and pitching or paving commence,—where it is cheaper to cover a road with small unfixed broken stone or to pave the entire surface with fixed blocks, it would appear, at first glance, that that road which has the greatest number of vehicles passing over its surface should determine this, but I am of opinion that such is not the case. The mere enumeration of the vehicles passing a given point on a road will not enable us, without other considerations, to draw a hard and fast line where it is more economical to pave roads in preference to Macadamising them. We must also take into account (*a*) the class of traffic, subdividing this into heavily weighted, spring, narrow-tyred vehicles, and carriage traffic; (*b*) the gradient; (*c*) the nature of the bottom; (*d*) the width, and the height of the buildings. In three of these considerations (*a*, *b*, and *c*) the Wardwick has superior conditions to Bridge Gate: we thus see why the former is a more economical road to maintain than the latter; therefore, every street must be treated on its own merits.

To ascertain whether it would be a saving to pave certain streets, I have endeavoured to obtain the cost of repairing and cleansing the same. I have left the watering out of the estimate, as I cannot even approximately obtain figures sufficiently reliable to enable me to produce them here.

The traction on level roads has been ascertained to be nearly as follows :—

Roadway asphalted	1·0
„ paved, dry, and in good condition	2·0 to 1·5
„ paved, and in mediocre condition	2·5 „ 2·0
„ paved, but covered with mud	2·7 „ 2·0
Macadam in good condition and dry	3·3 „ 2·5
„ wet	3·3
„ in mediocre condition	4·5
„ covered with dirt	5·5
„ with the stones loose	8·2 „ 5·0

This is a low estimate. Some careful experiments give, taking the maximum load a horse can draw on a gravel road as a standard :—

On a best broken stone road	3	times as much.
On a well-made pavement	4½	„
On the best stone trackways	11	„
On railways	18	„

Here we see that there is a loss of more than 100 per cent. of motive power between macadam in a mediocre condition and a roadway paved and in good condition, and assuming that 951 tons are daily carried along a certain road 300 days in the year, and the average friction is 1-20th of the weight, the cost of transporting this burden is 1,664*l.* per annum. If we reduce the traction by one half, as above, we reduce the cost of transport on this road to 832*l.*; but, assuming this to be a theoretical supposition, and we take it at half, viz., 416*l.*, this would practically be the actual sum saved in horse-hire alone, by having the street properly paved.

* See the Report of the Borough Engineer of Leeds.

* Omnibuses, railway vans, &c.

We now come to the question of cost of cleansing, &c. Taking the number of square yards of its area at 3,000 in round numbers, we have ascertained that the cost of cleansing the street is 80*l.* 10*s.* per annum. From careful observation it has been ascertained that four loads of mud or slop are removed from macadam per 1,000 yards of surface to one load per 1,000 yards of granite-paved surface, which is reduced to one-third of a load on a surface paved with wood. I will, however, take the quantity at one-half, as we purpose to use granite as the material for paving this street hereafter; this will save 45*l.* 5*s.* for cleansing. This calculation does not include the carting of the slop to a shoot, which would bring the total up to 100*l.* a year while macadamised, and the saving in cleansing if paved to 50*l.* a year. The saving in maintenance will be this:—the original cost per yard, including concrete, will be 13*s.*, the cost of maintenance I have estimated at 4*d.* per yard per annum, the life of the road I have estimated at twenty-five years. This gives us a total cost of a little over 10*d.* per yard per annum, or 125*l.* for the whole, as against 216*l.* 6*s.* 6*d.*, the present cost, thus effecting a saving of 94*l.* per annum; add this to the 416*l.* and the foregoing 50*l.*, and we effect a saving of no less than 560*l.* per annum to the community at large, to say nothing of the freedom from dust and the increased comfort to every person using and living in the road.

From careful observation I should say, all other things being equal, it is cheaper to pave a roadway having a traffic of one thousand vehicles per diem over its surface than to macadamise it, and this would be the minimum number to commence paving with.

We must now inquire and specifically lay down what are the requirements for such paved streets. The engineer of Birmingham has admirably set them forth in a recent report to the Council of that borough. He says:—"They should be even-faced, firm, hard, as noiseless as possible, able to bear any burden, with sufficient foothold for horses, and capable of being easily cleansed so as to diminish as much as possible the annoyance arising from mud and dust; the nearer these objects are attained, the less will be the wear and tear of the roads as well as of the vehicles; property and health will be less injured, and the comfort of pedestrians increased."

These, then, are the desiderata of Highway Authorities, and, as will be seen at a glance, most difficult of attainment. To obtain noiselessness and the least friction the surface must be smooth; to obtain a firm foothold for horses the surface must have a certain amount of roughness (I use the word in place of a better one which I cannot find, though it hardly expresses my meaning), so that two of the desiderata are inverse to each other, for as we decrease the noise and friction we increase the slipperiness. To endeavour to make these meet the material should be as hard as possible, providing it gives the requisite amount of roughness of surface by attrition.*

KENT ARCHÆOLOGICAL ASSOCIATION.

The annual meeting of this society was held on the 26th and 27th ult., the head-quarters being located at Gravesend, where, at the Literary Institution, a temporary museum was formed, under the care of the Rev. R. P. Coates, the Rev. F. Southgate, and Mr. Homewood, a principal feature of the exhibition being the collection of charters and deeds relating to the borough of Gravesend, lent by the Corporation. The excursions were under the direction of Mr. F. C. J. Spurrell.

The first day's proceedings commenced with a drive to Cooling Castle, which the owner, Mr. John Murton, had thrown open for the nonce. With few exceptions the upper parts of the castle have vanished altogether; but from the ruins that remain it is easy to judge of the appearance of the building when in its prime. Marshalled to a vaulted chamber, whose masonry would be the utter despair of modern builders of the suburban villas which adorn "residential properties," and on whose massive roof trees were growing, the assembled archæologists held a business meeting. The report, read by the secretary, the Rev. Canon Scott Robertson, began by acknowledging the cordial reception the Association had experienced from the Corporation of Gravesend, and went on to lament the loss which it had sustained during the past year in the deaths of Earl Stanhope, Lords Fitzwalter and Sondes, and other valued members. The Society, however, was more flourishing than at any previous period, thirty-three members having been elected in the course of the year, while the names of twenty-six gentlemen were to be submitted to that meeting.

The report was unanimously adopted, and the twenty-six new members proposed. Mr. John Monckton, of Maidstone, was added to the council. Auditors and other officers having been elected, and the business satisfactorily disposed of,

The Rev. Scott Robertson read a paper on Cooling Castle. Cooling was a manor of the lords of Cobham, and here, in the fourteenth century, they had a pleasant manor-house, which would probably have remained a simple manor-house as long as it existed at all, but for a circumstance not generally known to the students of English history, and which may possibly have been suppressed as not altogether to the national credit. In the year 1379, it appears, some French vessels sailed up the mouth of the Thames, nearly, if not quite as far as Gravesend, and a motley crowd of Frenchmen and Spaniards having landed from the piratical craft, overran the surrounding country, plundering the people and burning the villages. John de Cobham, third Lord Cobham, with the view of preventing a repetition of this disgrace and danger, obtained from the king a licence to fortify his manor-house of Cooling, and by the year 1385 the castle was completed, receipts being still in existence showing the amounts paid from time to time for masons' and plumbers' work. It was then a very imposing building, surrounded by a deep moat, well calculated to resist an enemy, to afford protection to the surrounding district, and to maintain a garrison which would effectually check the ravages of ordinary marauders. The ruins which now stand, and over which Mr. Robertson subsequently conducted the excursionists, attest at once the vast extent of the castle and the completeness of all the preparations for defence: while on one of the towers at the entrance gateway are some lines in enamelled letters, almost as perfect as if they were the work, not of five centuries, but of five years ago, stating the object with which the fortification was erected. Mr. Scott Robertson seemed to think, especially as the lines were in English and not in Latin, that the inscription was placed on the tower for the purpose of assuring the peasantry that the castle was not built for the purpose of tyrannising over them; but inasmuch as school boards were then unknown, to say nothing of the fact that the keenest eyesight could scarcely from the ground decipher the lines, which are placed at a considerable height, the proposition is open to dispute. One part of the outer wall of the castle is ornamented with black and white stonework in the chess-board pattern,—a style which Mr. Robertson says is not at all uncommon in East Anglia, but is almost unique in Kent.

Before leaving Cooling Castle, on the motion of Sir Walter Stirling, seconded by Dr. Carr, a very cordial vote of thanks was given to the Rev. Scott Robertson for his valuable paper; and to Mr. Murton, the hospitable owner of the Castle, who entertained a very numerous party to luncheon.

A visit was then paid to Cooling Church, an edifice of a rather remarkable character, seeing that its chancel is, if anything, larger than the nave,—a nave, by the way, destitute of aisles,—and that it contains twelve stone canopied stalls. On whose account those stalls were placed in the little chancel of the little church it is impossible to say, but Mr. Scott Robertson's conjecture that a religious community once existed here, of which all trace,—except the canopied stalls,—has disappeared, is probably the right one. The chancel is of the time of Edward I.; the nave was erected in the reign of Edward III.

Cliffe Church was next visited. It is very large, and seems to suggest that at some period Cliffe must have been a place of importance, or else that a considerable religious brotherhood made its home in the neighbourhood. The chancel is a fine one, there is an ancient screen of carved oak, and the side aisles are divided from the body of the nave by some really fine arches of the Early English order of architecture. The many interesting features of the church, which has been partially restored of late, were pointed out in a paper by the Rev. J. Grey Lloyd.

The excursion terminated with a brief visit to Higham Church, and at five o'clock, with commendable punctuality, the party arrived at the Gravesend Assembly Rooms, where dinner was served, the chair being taken by the President of the Association, Earl Amherst, who was supported by the Mayor of Gravesend (Mr. W. Lake), Sir Walter Stirling, bart., and others. The speeches were few and short, as they should be on such occasions.

After dinner an evening meeting was held, when Mr. G. M. Arnold read a paper "On the Early History of Gravesend." The author pointed out that although Gravesend could not boast the castellated buildings of the neighbouring city of Rochester, she could lay claim to association in the past with much that was of archæologic note. The site of the ancient church of St. Mary had long since become secularised, and at present had houses built upon it. In 1497 the townsmen had provided a chapel-of-ease, which was the germ, and occupied the parish church of St. George. The immediate neighbourhood of Gravesend was not without interest. Southfleet and Springhead were very rich in Roman remains, and Roman pottery was discovered there until this day. The well-known archæologist, Mr. Charles Roach Smith, had spoken of Springhead, while writing upon the subject of a Roman villa near Maidstone, as surrounded by all the requirements of an ancient Roman station. The existence of a direct military road to Rochester was one of these. Referring to the struggle against Norman and Dane which had taken place, the writer pointed out that these periods of unrest naturally caused the inhabitants to take extraordinary precautions in securing their money, and thus within recent date there had been discovered in the vicinity of the ancient church of St. Mary a hoard of 552 Saxon silver coins, since deposited in the British Museum. They were dated 814. Deposited in a secure place by terror-stricken individuals, they were destined, after the lapse of over a thousand years, to be restored to the light of day. While on the subject of discoveries, the writer mentioned the disclosure of an interesting cave during sewer excavations in Perry-street. References were made in the Domesday Book to the manors of Gravesend, Parrock, and Milton, now included in the two parishes of Gravesend and Milton, and it was a pity that the Domesday Book of King Alfred was not still extant to the inquirer, as other interesting information might have been found therein. Proceeding to speak of Milton Church, the writer remarked that the site of this edifice, near to the river bank, did not appear to have undergone the change which he had mentioned in the case of the church at Gravesend. No Norman work was observable in Milton Church, and it was probably rebuilt, with the exception of the roof, in 1350. The original roof appeared to have been removed during the reign of Henry VIII. Cruden stated that the roof was subsequently restored with a waste of money only commensurate with the want of taste. The writer next went on to deal with some of the distinguished events which had taken place in the neighbourhood.

Earl Amherst having conveyed the thanks of the meeting to Mr. Arnold for his paper, the proceedings of the first day were brought to a close.

On the second day the party visited Shorne Church and Cobham, passing, *en route*, Chalk Church, over the porch of which there are some singularly grotesque carvings in stone. The church, which is dedicated to St. Mary, is about undergoing restoration, and contains a very ancient and curious stone font. The church of St. Peter and St. Paul at Shorne possesses a very interesting altar-tomb, with effigies in full armour of Sir Henry de Cobham, surnamed "L'Oncle," to distinguish him from his nephew, Sir Henry, of Cobham Hall, who, being five times sheriff of Kent, was knighted by Edward I. for his gallant conduct at a famous siege. Here there is an octangular Decorated font, wrought with Scriptural subjects, and a number of brasses, notably that of William Pepys, 1468, a former vicar, and supposed ancestor of the "Diarist." A pleasant drive to Cobham Park, entering by Brewer's Gate, brought the party to Cobham Hall, which had been kindly thrown open for the occasion by the Earl of Darnley.

Cobham Hall stands in a hollow, surrounded by wooded hills, and is approached by a grand avenue of lofty trees. Two extensive wings of red brick, with lofty turrets at the angles, bearing the dates of their foundation, 1582 and 1594 respectively, with mullioned windows, ornamented doorways, and cornices in the

* To be continued.

Tudor style, are connected by a central building in the Italian style, designed by Inigo Jones, the apparent incongruity only increasing the picturesque appearance of the building. The deep red colour of the bricks, the bold outlines and gables, the singular fashion of the chimney-shafts, and the lights and shadows of the deep bay windows, produce an effect which, as a whole, is pleasant and harmonious. The wings and southern front were built by Sir William Brooke, Lord Cobham, the centre by the Earl of Lennox towards the reign of James I. Visitors are ushered into the hall through a vaulted passage, designed by John Wyatt, where they are shown a bath of Egyptian granite; thence they proceed to the dining-hall, which has panelled walls and ceiling, and where there is a grotesquely-carved chimneypiece in black and white marble. The picture-gallery and library contain, in addition to many valuable works of art, portraits of great historical interest. The duties of *cicerone* were performed by Mr. F. G. Stephens, the architectural details and history of the hall being dealt with by the Rev. J. Scott Robertson.

A drive from the hall to Cobham Church opened up to the visitors fresh scenes of sylvan beauty. The halt was made near the old Leather Bottle—immortalised in the "Pickwick Papers." Cobham Church, which stands directly opposite this hostelry, is situate on a gentle slope at the entrance of the village from Gravesend, and is dedicated to St. Mary Magdalene. It has a fine tower and chancel, with three spacious aisles. The walls still retain traces of the frescoes which once adorned them. The altar-steps are paved with encaustic tiles. Amongst those who there lie entombed, and to whose memory monuments or brasses have been erected, we find Sir John de Cobham in his shirt of mail, died 1354; Sir Thomas de Cobham, died 1367; Maude, wife to Reginald, Warden of the Cinque Ports, died 1370. There is an inscription to another Maude, of which nothing but the name is legible; and Margaret, wife of John, Lord Cobham, 1395. This Lord Cobham was the founder of the church and college adjoining, and his reputation as saint and warrior survives him. Joan, mother of the founder, has here a monument to her memory, which bears a French inscription. There are also brasses to William Tanner, 1418, John Gladwyn and John Spratt, 1498, former masters of the college, which was founded 1342. An ancient gateway and some ruins still remain. The present structure, which is built in a quadrangular form, is divided into almshouses, occupied by a number of aged men and women. A blackened roof and oak-screen in the hall are subjects of interest to visitors. The various monuments and brasses, and other objects of interest, were described by Mr. J. G. Waller.

From Cobham the visitors proceeded to Swanscombe, where the ancient church, rich in Saxon remains, was inspected, the various objects of interest being explained by the rector (the Rev. T. H. Candy) and Mr. Roes.

From thence the party proceeded to Northfleet, where, at St. Botolph's, the Rev. F. Southgate, vicar, chaperoned the party. Here there are some very fine monuments. The examination of this church concluded the business of the meeting.

ARCHITECTURAL SOCIETY OF THE ARCHDEACONRIES OF NORTHAMPTON AND OAKHAM.

The annual summer excursion of this Society took place on Wednesday and Thursday, the 19th and 20th ult. The programme set forth that on the former day the towns and churches of Leighton Buzzard, Dunstable, Luton, and Wheathampstead would be visited, and that the day's journey would terminate at St. Alban's, where, in the evening, a public meeting would be held at the Town-hall.

Leighton Buzzard.—We glean from the *Northampton Herald* that a goodly company assembled at the church of this town about noon, and were met by Dr. Lawford and the Rev. Canon Haddock, the latter of whom conducted the party round and through the building, and directed attention to, and discoursed upon, the principal points of interest both of its exterior and interior. The church is cruciform in plan, and consists of a nave, chancel, north and south transepts (with a central tower and spire), north and south aisles, north and south porches, with, north of the chancel, an ancient sacristy, surmounted by a *domus reclusus*, or domicile of a priestly recluse. The tower, of which the plan dimensions are unusually large, is of the Early English period, and the massive spire is probably of only a little later date; both were originally built upon severe designs, but have been modified by subsequent alterations and insertions. The tower is built of "clunch," a cretaceous limestone, and the spire (of which the condition is surprisingly unimpaired) probably of an oolitic limestone. The chancel also is in great part of Early English date; the transepts, originally Decorated (fourteenth century), have Perpendicular windows. A door in the south transept is covered with fine wrought-iron scroll-work, the original portions of which are precisely similar to the iron scroll-work (the artificer of which is known) of the tomb of Eleanor Queen of Edward I. in Westminster Abbey. The nave is surmounted by a remarkably fine Perpendicular clearstory, the large beautiful three-light windows of which are arranged in couplets. In the interior, the beautifully and elaborately carved Perpendicular roof of the nave, of unusually high pitch for the style, is very fine. From the church, the party (which, in the meantime, had received many accessions, including members of the Bedfordshire and Leicestershire Societies) proceeded to the Cross, in the High-street. This is a handsome erection of the fourteenth century. It stands upon a base consisting of a plinth or pedestal, and a series of four steps. It comprises two stories, an elevated crocketed pinnacle finished by a weather-vane surmounting the upper one. The lower story is pentagonal in plan, and consists of five open two-pointed arches supported on angle buttresses, enclosing a massive central column. The upper story has also a pentagonal plan of smaller dimensions, and consists of five cinquefoil-headed canopied niches, surmounted by foliated finials, separated by angle buttresses, also terminating in foliated finials, and outstanding disengaged buttresses, similarly decorated and connected with the inner ones by flying buttresses. In each of the five niches is a life-size statue. Three of these statues are modern copies, and were substituted for the originals at the restoration of the cross, which was effected some years ago. The mistakenly displaced and only partially impaired original statues have been judiciously erected in front of the public reading-room hard by, which looks down the High-street.

Dunstable.—The first view of the surpassingly beautiful fragment of the western façade of the priory church struck every one who now gazed upon it for the first time with surprise and admiration. Only about two-thirds of the original front remain. It partakes more of the character of the western front of some Continental cathedral, than that of an English church. A very large semicircular-arched and deeply-recessed central doorway, of Norman (or perhaps semi-Norman) architecture, with numerous bold, rich, and successively-receding mouldings, gives admission to the church. Above this, in the west wall of the nave, are two good Early English, single-light, lancet windows, and between them is inserted a bold and ornate statue niche, exceeding 12 ft. in height, and having trefoil cusping, of Early Geometrical Decorated date. On the north side of the central arch is a wall-space, enriched by a semi-Norman pointed arch, containing intersecting semicircular arches, having a very bold and peculiar filleted roll-moulding; nearly identical filleted moulding occurs also in arcades of intersecting arches in the passages south of the south transept of St. Alban's, which formerly led to the chapter-house. This wall-space separates the central from a smaller yet fine doorway, also recessed, the jambs of which are Early English, and composed of the usual range of slender columns, having richly-carved capitals of stalked foliage. The arch is pointed and composed of many deep mouldings of a little later style, three of which are enriched by fine and peculiar undercut foliated carving. Over this doorway and arched wall-space is a late Early English arcade of seven recessed arches, in each of which is a pedestal for a statue; and the spandrel-shaped portions of wall surface beneath are covered with the exquisite diapering so characteristic of Westminster Abbey. Over the Early English arcade is a still bolder arcade of very excellent work, consisting of six trefoil-headed arches, each nearly 12 ft. in height, and of the same date as the niche over the great central door, which arcade is an open gallery leading from the tower stairs to the northern triforium of the interior. Over the half of this arcade, to the right hand, is a smaller blank arcade of five lancet arches, which have been supported by slender shafts; and above this, and surmounting the front nave wall, is an embattled parapet of much later date. The wall over the other half of the arcade recedes with a roof-like incline for several feet to the west wall of a massive tower (the base of which on that side is hidden by the façade, although exposed on the north side); and immediately above the junction is a string-course or band of quatrefoils. The top story of the tower is the bell chamber (containing a fine peal of eight bells), on each side of which are two two-light Decorated windows arranged in couplets. Attached to the north-west angle is an octagonal staircase, consisting of three receding stages; on three faces of each of the lower two are large niches, of the same date as those of the façade, in some of which are still fragments of statues; these stages are surmounted by an octagonal turret, running up to a greater height than the tower; the turret is based by an arcade of six blank arches, of the same date as the niches below. All corresponding portions of the west front south of the great central door have disappeared. The great doorway is partially filled in by the insertion of a square-headed door with carved spandrels surmounted by a triform niche, and dating either towards the end of the fifteenth or in the beginning of the sixteenth century. The Rev. Frederick Hose has been for many years the incumbent of Dunstable, and for all that time has made the restoration of the fine ruin which he found a labour of love. He met and welcomed the party at the great door of the church, described the exterior, directed attention to the chief points of interest in the interior, and explained what he had done, and how, in the restoration, and what he intended to do. The work has been chiefly effected under the care of Mr. Somers Clarke, architect. Already 10,000*l.* have been expended,—raised entirely by the exertions of Mr. Hose, who said he had now in hand 1,000*l.* to be devoted to further work. The interior consists of the nave of a fine Norman church, with north and south aisles. The ancient choir does not remain, although its foundations might probably be found grass-covered on the eastern exterior of the church. The piers of the nave arcades are very massive and grand,—much more so than those of St. Alban's, and are probably equal to those of Peterborough: these are surmounted by a triforium, consisting of an arcade of bold arches, subdivided into two smaller arches in the usual manner. Over these are a series of semi-Norman or Early English clearstory windows. The south aisle is Norman, and vaulted; it has been wholly restored, about two-thirds (with the exception of the nave piers) having been almost wholly re-erected, but in exact repetition of the ancient forms. The restoration of the north aisle has not yet been commenced, but is the next work to be undertaken. The nave and outer walls on this side can only be kept standing by abundant shoring. This aisle contains a series of fine Perpendicular windows. The western wall of the nave is enriched in the interior by an arcade of five lancet-headed arches of different heights, the central one being lower than that on either side; two are pierced as windows. The font is new, but is an exact repetition, both as to size and ornament, of the ancient one. It is circular and very massive, the huge bowl being supported upon a base of nearly its own dimensions, and without any apparent division. Bands of Norman ornament encircle both bowl and base.

Luton.—The church here is large and interesting, but the condition of the exterior has been, and in part still is, in a lamentable state of dilapidation, although a long-continued process of reparation has been going on. The party were met in the churchyard by the incumbent (Mr. O'Neil) and the Rev. Canon Haddock, who again acted as cicerone. The church is a cross church, and consists of chancel, nave with north and south aisles, north and south transepts, north and south porches, and a large addition north of the chancel called the Wenlock Chapel; the tower is at the west end of the north aisle. The masonry of the exterior is very peculiar; it consists of chequers of "clunch" and flints, each chequer being nearly a square foot in size, and the wall surface presenting a very draught-board kind of appearance. In the east end have been inserted three lancet windows, with slender columns and foliated capitals, stated to be the work, many years ago, of an architect now of

considerable eminence, but it is of so poor a character as to be altogether unworthy the reputation he has since obtained. This offers a complete foil to the bold and effective, although dilapidated, Perpendicular work of the adjoining east gable of the Wenlock Chapel. The most striking object in the interior is the baptistery, which stands in the centre of the west end of the nave. This is an octagonal erection of very beautiful Decorated design, which contains and canopies the font; it is about 19 ft. high and from 10 ft. to 12 ft. in diameter, and is sufficiently capacious to hold nine or ten persons round the font, which is plain. Each side is adorned with a traceried arch. The compartments are divided by eight buttresses, terminating in crocketed pinnacles. Below the arch in each of seven sides (the eighth side is an entrance containing steps), and between each pair of angle buttresses, is an embattled wall, about 4 ft. high, on the face of which is an arcade of two cinquefoil arches, with crocketed hood-mouldings and finials, and crocketed pinnacles. The workmanship of this unique structure is not equal to the design, but it may have suffered deterioration by having been several times moved. About ninety years ago it stood under the third arch from the west end in the south nave arcade. At that time it was moved to nearly its present position. About 1822 it was moved to the south transept, and some years ago back to its present position. The baptistery is figured as the frontispiece in "Simpson's Fonts," published in 1828. Towards the west end, in the wall of the south aisle, in a canopied recess, is the effigy of a priest in his robes. These are defined with great particularity, and were fully described by Mr. Bloxam, F.S.A., who stated that the effigy dated from the 15th century.

Wheathampstead.—The Rev. Owen Davys met the party at the station at 4.15 p.m., and conducted them to his beautiful church. This is built of flint, with limestone quoinings and dressings. The church is a cross church of no great size, and a peculiar and effective if not beautiful leaden spire of some elevation rises from a tower of no great height at the intersection of the transepts. There is a built-up Saxon door in the wall of the south transept, but the chief portion of the present church is Early Decorated. There is a south porch; but the principal entrance is by a highly-ornamented and good doorway in the west end. Historically, Wheathampstead is connected with St. Alban's by the fact that John of Wheathampstead was abbot of that great abbey from (with an interval) 1420 to 1451.

St. Alban's.—An evening meeting was held in the Town-hall, at which the Rev. W. J. Lawrance, rector of the Abbey Church, in the name of the Hertfordshire Society, welcomed the members present of the Northamptonshire and Leicestershire Societies. This compliment was acknowledged by the Rev. N. F. Lightfoot and the Rev. J. H. Hill, hon. secs. respectively of these societies. A paper of great research upon the former choir arrangements of the St. Alban's Abbey Church was read by Canon Davys.* Sir Gilbert Scott followed with a very interesting *vivâ voce* explanation† of the early history of the abbey, and of the dates and character of the different portions of the building, in which he took occasion particularly to distinguish the rich semi-Norman work of the abbot, John de Cella, of the close of the twelfth century, from the more economical Early English work of the abbot, William de Trumpington, of the beginning of the thirteenth century,—two of the most important contributors to the building of the abbey. Sir Gilbert also directed attention to the various discoveries made in the course of the work of restoration, and to the many other matters of interest in which St. Alban's Abbey is so rich. Mr. Neale (who is about to publish an account of the history of the abbey, and a detailed description of its distinctive portions and contents, illustrated by engravings of his numerous exquisite drawings), then read an able although concise paper, giving in very condensed form much of the matter which will be published *in extenso* in his work. Mr. Matthew Bloxam followed with an explanation of the important discoveries which he had made twenty-three years ago, in what might then almost be termed the abbey ruins; and he was followed by the Rev. J. T. Barker, rector of Rushden, who felicitously offered thanks on behalf of the numerous visitors for the welcome and hospitality with which they had been received, both by the members of the Hertfordshire Society and by the inhabitants of that ancient town, so soon to become a city; and he took advantage of the occasion to protest (in reference to a tendency too prevalent in the present age) against ancient truth being permitted to be swamped by the discoveries and conclusions of modern science.

On the following day, Thursday, the 20th ult., a numerous company assembled at the west front of the abbey, and were conducted round the exterior by Sir Gilbert Scott, who explained as he proceeded. A long dissertation upon the mythical, traditional, and historical incidents in connexion with the Abbey of St. Alban—such as the martyrdom of St. Alban (said to have taken place during one of the persecutions of the Christians by the Emperor Diocletian early in the fourth century), the building of a Christian church on the site of his martyrdom, said to be that now occupied by the present south transept, &c.—was given in the garden of the rectory close by. After this, Sir Gilbert Scott, Mr. Ridgway Lloyd (who has published a detailed account of the shrines, altars, monuments, and tombs in the abbey), and Mr. Neale, accompanied the party throughout the abbey, and with great pains pointed out *in situ*, and explained, all matters particularly worthy of note.

Hatfield House was visited in two parties—one courteously conducted by the rector, and the other by the house chaplain. The great banqueting-room, the dining-room, the library, the chapel, drawing-room, ball-room, billiard-room, royal bed-room, state bed-room, Queen Elizabeth's room, Duke of Wellington's room, the Cromwell bed-room, other bed-rooms, and the private drawing-room and morning-room of the Marchioness of Salisbury, with all their varied and valuable contents, were minutely inspected.

* To this and some others we shall return.
† A report of this is given on p. 755, *ante*.

EXCURSION OF THE ARCHITECTURAL ASSOCIATION.

The scene of the seventh excursion will be Winchester and the neighbourhood. The course of it will be as follows:—

Monday, August 14th.—Winchester Cathedral. The party will be conducted over the cathedral by Mr. John Colson, F.R.I.B.A.—The College buildings will be explained by Mr. C. R. Pink, A.R.I.B.A.

Tuesday.—Ashley, King Sombourne, Romsey Abbey, and Hursley. At Romsey Abbey the party will be conducted over the building by Mr. James Fowler, F.R.I.B.A.

Wednesday.—Christchurch. The party will be conducted over the building by Mr. Benjamin Ferrey, F.S.A.

Thursday.—Cheriton, East Meon, Warnford, Corhampton, and Meon Stoke.

Friday.—Salisbury.

Saturday, August 19th.—The Hospital of St. Cross, the County Hall, the new Law Courts, St. John Baptist, and St. Peter, Cheesehill. At the County Hall and the new Law Courts the party will be conducted by Mr. Matthew Wyatt, A.R.I.B.A; at St. John Baptist and St. Peter Cheesehill, by Mr. C. R. Pink, A.R.I.B.A.

THE INDIA MUSEUM.

A deputation of delegates from workmen's clubs of London, headed by Mr. Hodgson Pratt, chairman of the council of the Working Men's Club and Institute Union, waited upon the Lord Mayor at the Mansion-house on the 26th ult. to ask his co-operation and support of the proposal to establish a museum for India and the Colonies on the Victoria Embankment. The Lord Mayor acknowledged the importance of the question, and expressed his willingness to head a deputation to the Prime Minister, and do all he could to obtain the support of the Government. A memorial, drawn up by a committee appointed at a meeting of the working classes of the borough of Finsbury, and forwarded to the Prime Minister, runs thus:—

"As artisans desirous of improving our artistic taste and industrial knowledge, your memorialists consider it highly desirable that we should have free and ready access to the admirable specimens of Indian workmanship to be found in the India Museum. The natural products and manufactures of that collection throw great light upon handicrafts in which we are engaged, and are calculated to promote our technical knowledge. For some years past we have, in common with all other members of the working classes in London, observed with regret that many valuable collections are, to an increasing extent, removed to South Kensington. That quarter being at the extreme end of the metropolis, and at the end furthest removed from the districts inhabited by workmen, great numbers of our class are altogether precluded from visiting the collections there, or, at least, very rarely and hastily. The very considerable distance not only adds to the expense, but often consumes half the limited time at our disposal. Your memorialists have therefore learnt with the greatest satisfaction that there is a site, the property of the Crown, close to Charing-cross, and situated on the Victoria Embankment, where the present Indian collection might be placed and arranged in suitable buildings. Your memorialists very earnestly trust that Her Majesty's Government will take such steps as may be necessary to secure the site in question for these museums."

It may or may not be desirable to put up a building on the Embankment for the Indian collections, but there is an immense amount of humbug in the assertion that the working classes will not go to see them at South Kensington, and will if they are lodged on the Embankment. The same thing was said in respect of the Architectural Museum. How many of the working classes go to "study" that collection now it is in Westminster? The working classes will be just as likely to go to the Indian and Colonial Museum if it be established at South Kensington as if it be located on the Embankment.

STATUES.

The Prince of Wales.—The *Manchester Guardian's* London correspondent understands that Sir Albert Sassoon, who intends to present an equestrian statue of the Prince of Wales to Bombay, has transferred the commission for this work to Mr. Boehm, in consequence of the death of Mr. Noble, to whom it was originally entrusted. The statue will cost 5,000*l.*

Mr. John Bright.—A movement is on foot for the presentation to the Manchester City Council, of a marble statue, by Theed, of Mr. John Bright, which, it is hoped, may be placed in the new Town Hall. Mr. Bright has already given several sittings to the artist. The statue, which will cost about 1,000*l.*, will be life size.

Earl Canning.—Mr. T. Brock's equestrian statue of Earl Canning for Calcutta has been inspected by the committee. It is expected to be exhibited in London prior to its removal to India.

Mr. John Stuart Mill.—It is stated that Mr. Woolner, R.A., has nearly completed the full-size model for the statue of the late John Stuart Mill.

The Right Hon. C. P. Villiers.—Mr. W. Theed, the sculptor, has just completed a full-length statue of the Right Hon. C. P. Villiers, M.P., which is about to be offered to the Town Council of Manchester, to be placed in one of the galleries of the New Town-hall.

Mr. Plimsoll, M.P.—The movement originated by a committee of working men in London "for erecting a statue of the true and noble-hearted friend of the sailor, Samuel Plimsoll, esq., M.P.," is progressing favourably, and Mr. R. Belt, the sculptor, has been commissioned to execute the work, which is rapidly approaching completion.

Mr. Adam Black.—An accident has happened to the sculptor's model for the statue of the late Mr. Adam Black, which must occasion considerable delay in the completion of the work. The commission, it will be remembered, was entrusted to Mr. John Hutchison, R.S.A., who was bound to have the statue completed within nine months. Proceeding on this understanding, the sculptor had worked with such assiduity that he was enabled to give the finishing touches to his model in rather less than eight months from the date of its commencement. The model was executed, according to Mr. Hutchison's usual practice when working for bronze, in a reddish clay. Finished on the 14th ult. the statue was seen to be all right at nine o'clock on Sunday evening, the 16th, when one of Mr. Hutchison's assistants looked in for the purpose of moistening the clay. At seven o'clock next morning, when the workmen entered the studio, it was found a ruin, great masses of clay having fallen away so as to expose the wooden framework on which the model had been built. The explanation had been suggested that the occurrence might have been due to the expansion of internal air by the excessive heat of the weather, the thermometer in the studio on Sunday having marked a temperature of 90°. Much sympathy is felt for the sculptor, who has lost the fruits of eight months' arduous labour. The memorial committee have granted an extension of time for the completion of the statue.

BATS.

Sir,—Will some of your numerous readers suggest a mode of getting rid of or abating the nuisance occasioned by numerous bats which have taken up their abode amidst the timbers of a painted Perpendicular roof? J. B.

BUILDERS' BENEVOLENT INSTITUTION.

The twenty-ninth annual meeting of this charity was held on Thursday, the 27th ult., at Willis's Rooms, St. James's, Mr. George Dines in the chair. The report for the past year (read by the secretary, Major Brutton) showed the Institution to be progressing in prosperity and usefulness. During the year the directors have purchased the sum of 750*l.* stock Three per Cent. Consols, making the Relief Fund amount to 15,701*l.* 6*s.* 10*d.* Steps are being taken to add the amount of the Building Fund (3,531*l.* 0*s.* 5*d.*) to the Relief Fund, it having been decided not to build almshouses, the pensioners invariably preferring to live with their friends. Five new pensioners were elected during the year. The report expressed special thanks to the president for the past year (Mr. John Aird) for his services, whereby the funds were considerably augmented; to Mr. J. T. Bolding, for his services in connexion with the ball (which realised a profit of 90*l.*); and to Mr. Thomas Stirling for his services as secretary *pro tem.* The balance-sheet showed the total receipts (including balance in hand last year and interest on investments) to be 2,922*l.* 8*s.* 3*d.*, the expenditure being 2,398*l.* 10*s.*, leaving a balance in hand of 523*l.* 18*s.* 3*d.* The report and balance-sheet were unanimously adopted. Votes of thanks were given to the directors and office-bearers for the past year, and the officers for the current year appointed, Mr. Charles B. Waller being elected president. Section 6 of Rule II. was amended by the insertion of the words, after the word "election," "For every such 20*l.* bequeathed and actually received," so that the rule now reads as follows:

"That should an executor, paying a legacy, or any other person having the discretionary disposal of property, contribute to the funds of the Institution a sum of 20*l.* or upwards, he shall be entitled to two votes at all elections for every such 20*l.* bequeathed and actually received; should there be more than one executor preference shall be given to the one named by his co-executor."

A HILL OF MARBLE; BEETHAM FELL, LANCASTER.

It will be news to some that marble in quantity and quality equal to any imported is to be obtained in our own country, "marble which takes a polish much superior to any now in use,"—at least, so says a correspondent who sends us an account of the place. It is called Winscar, and is owned by Mr. Wilson, of Dallam Tower. The men are squaring blocks of the rock, and we are told that it is marble, of which the hill is full. There is something peculiar about the formation of the rock, and we stop to examine it. No matter how small a piece is picked up, it is most beautifully marked. There are three quarries on this hill, and although they lie within the space of 100 acres, each quarry yields a distinct kind of marble. The first, which is called "The Agnes Quarry," lies on the side of the hill nearest to Milnthorpe, and contains, perhaps, the best marble of the three. It has a reddish appearance, but it might, more strictly speaking, be said to be of a mahogany colour. About 10 ft. from the surface of this quarry, in a broad fissure in the rock, there is a vein of copper, which will, doubtless, ere long be got. The second quarry is called "The Sisters." The characteristic which first strikes the visitor to this quarry is the extreme roughness of the upper layer of rock. No one who sees it need be told (for it speaks for itself) that for thousands of years pebbles were washed across its surface, and that this was the real cause of the roughness. The second layer is remarkably smooth. This quarry is not only of fossil formation, but the marble has a pinky hue. It is said that this peculiar colour has never been found before. The third quarry is called "Winscar," the marble from which is whiter than from the others, but is beautifully marked. It ought to be stated for the benefit of those who are not aware of the fact, that there is a deposit of fossil formation at Dent: that is a dark grey fossil without a particle of red in it. There was one in Derbyshire also, but it is worked out. In Ireland there is a similar kind of fossil to those two named. We (says a Lancaster paper) were somewhat anxious to know how it happened that the coral fossil formation found in such abundance on this Fell had only just begun to be turned to account, and who was the enterprising individual. We learn that a gentleman about two years ago came to reside at Yealand with his family. He soon became known as a mineralogist (although we believe he would himself disclaim any such designation), and he was shown some specimens of rock from Beetham Fell. With his geologist's hammer in his pocket, he, at the latter end of last year, rambled over the hill, and applied the hammer to several bits of rock. He was surprised and delighted at what he saw, and when he discovered the nature of the limestone he began to think of a way of utilising it. He entered into an arrangement with Mr. Wilson, the owner of the Fell, and "The Beetham Fell Marble Company" began operations about five months ago. Much of the work so far has been of a preliminary character, and it might be deemed bold to hazard an opinion as to the amount of marble which will be got per annum. But we believe Mr. Baynes (for that is the name of the gentleman who discovered the value of the rock) is now very sanguine that there will be a good demand for the marble. Polished specimens of it have been sent to some of the largest dealers, who have expressed themselves very highly pleased with it; some has been sold; and there will next week be a block of the marble at Mr. Wilkinson's, Castle Hill, Lancaster, to be formed into a tombstone.

THE BAYEUX TAPESTRY.

Sir,—There is probably no more genuine and historical work of art, and none more interesting to the English people, than the record of the invasion of England by William the Conqueror, the Bayeux tapestry. Some years ago, at much cost and trouble, a full-sized facsimile of this piece of needlework was taken by the Science and Art Department. It is generally exhibited to the public in the Kensington Museum, on the east side of the south-east architectural court. So little do the authorities of the Kensington Museum appear to appreciate this interesting work, that for the second time they have concealed the tapestry by the somewhat feeble and monotonous drawings of the students of the schools of art, for which ample space could have been found, with a little ingenuity, in other parts of the Museum. Allow me to express a hope that Mr. Poynter will look to this, and, if possible, remedy it. I take the liberty of suggesting that a facsimile of this tapestry would be an attractive and useful prize of the Art-Union of London.

A Ghost.

ENGINEERS AND ARCHITECTS.

Sir,—In the interest of those few engineers whose special business it is to design and construct "fireproof floors," I am glad your correspondent "Concrete" has drawn attention to the mistake at the Ecoscevephoron at Pimlico; for it may be thought that some one of them is sadly at fault, though such I understand is not the case; however, the architects can best set that point right.

Floors constructed wholly of iron and concrete can be, and are, made perfectly indestructible by fire, and capable of sustaining any weight. It seems a folly that architects should be so shy of engaging the services of an engineer when they would be so relieved of anxiety they have no need to incur, and save their clients many scores of pounds often spent in patching up a weak or badly-constructed floor.

The floors your correspondent refers to I believe are about to be made good and strengthened by the addition of girders, which would have been wholly unnecessary had the iron joists been of proper strength at first.

The discussion at the Institute of Architects on concrete floors was by no means exhausted, for several systems largely adopted, and reported on by able men as good, were not even mentioned, and I know of a fact that gentlemen would have attended the Institute and described these systems, not from any commercial interest, but from purely scientific motives, were it not for the peculiar affection shown for a class and grade (I am not advocating, nor would I, the admission of any tradesman of any kind) and for the snubbing so frequently visited upon the unfortunate creatures below the rank of F.R.I.B.A. Not so the Civil Engineers, where *every* member is cheerfully and cordially welcomed and even invited to discussion, and where he is listened to, though he may differ in opinion from the "powers that be"; and I would, moreover, observe that the talk is not kept always in the hands of the same few as it is night after night at the Institute.

I am afraid my digression will be unpalatable, but permit me to add that architects should take a lesson from their brethren in construction, and then we might hear less of floors giving way, and see fewer girders cruelly distorted by an unfairly superimposed weight. I appeal to those architects (and there are a few) who do engage an engineer on their ironwork difficulties, to say if they do not find it the most satisfactory and the *cheapest* plan.

One who Knows.

LYME REGIS, DORSET.

Sir,—A subscriber to your paper for over sixteen years, I have found that a few hints given through its medium often have the desired effect; and you would greatly oblige me, and at the same time would be doing a social good, if you would wake up the inhabitants (or those who are in authority) of the town of Lyme Regis.

Although one of the prettiest watering-places on the South Coast, and commanding most extensive views both on sea and land, romantic walks and salubrious air, yet the town itself is in a most fearful state as to sanitary and other matters, though naturally well-situated for the carrying out of good sanitary measures.

Certainly there are stench-traps inserted, connected with the main sewerage drain in one or two principal streets, for the carrying away of superfluous rain-water; but at other times they are ventilators for sewage gas, which is very offensive.

As to the houses in which the working-class lives, one-half would be condemned by an inspector; they look more likely to fall on passers-by and their occupants than to stand, leave alone in many instances a family of six to eight sleeping in one room.

The supply of pure water is much needed also for the poorer class; although abundant, there is no supply or provision for them; and I may say one-fifth of the population have to resort to the *river* for their requirements, into which about twenty closets and drains empty, to say nothing of the vegetables and refuse from houses thrown in to decompose.

Better measures also are required to enforce education here. Children are running the streets semi-nude, and their language is often as offensive to the ear as the stench from drains is to the nose.

I hope this hint will be taken in good part by those who are in power *locally*, before they force those who are disinterested to insist on measures, probably at a greater cost than would be agreeable.

Solo.

AUCTIONEERS' VERBIAGE.

Sir,—Just now, when manufacturing, commercial, and financial stagnation prevails, and reflects on all industries and interests, would it not be well that the increased numbers of vendors of household property and "auctioneers" should discard the old Robinsian absurdities, to say nothing of criminally-erroneous descriptions and conditions of sale of "White Elephant Estates"? One of the most glaring of these absurdities in this intelligent age is to be subject to the twaddling nonsense (from a Tokenhouse-yard rostrum) of equality in value of a tumble-down house, with all its wear and tear associations, and British Consols!

That a number of intelligent grown-up men, of business experience, should be constantly hammered at by verbal stuttering, stammering, and disjointed descriptions of country "mansions," "sloping" green fields, "within a ring fence," &c.; "talked" to by some youthful "knight of the hammer," as if they were mere schoolboys ready to spend their pocket-money for "lolly-pop cheaps," is really worse than ridiculous,—it is quite offensive to the age of 1876. Can you not say a word to reform it, as well as to exhibit the totally false value (by rents) of house property at this present moment of general financial and industrial depression?

An Old Builder.

DECORATED STONE WARE.

Sir,—We observe in your notice of the *soirée* of the Institute of British Architects (p. 704) you speak of certain decorated stoneware as a leading feature in the exhibition "executed by Messrs. S. Belham & Co."

We feel sure you will allow us space to correct this, as we executed the pulpit, reading-desk, font, and capitals and bases of columns in decorated stoneware from designs by Mr. J. P. Seddon. They were sent to our depôt at Mr. Belham's, and he forwarded them to the rooms in Conduit-street for the *soirée*.

Bailey & Co.

Fulham.

COST AND CONSTRUCTION OF SEWAGE TANKS.

Sir,—Referring to the paper read by myself at the meeting of the Municipal and Sanitary Engineers' Association, and of which a notice appeared in the *Builder* (p. 709, *ante*), I shall feel obliged if you will permit me to acknowledge, through your paper, the fact of my being indebted to Thos. Dawson Ridley, esq., A.I.C.E., for the formula used, it being a modification of one given by that gentleman in a paper read at the Institution of Civil Engineers on the 8th November, 1870.

Thos. W. Grindle.

Books Received.

Algebra Self-taught. By W. P. Higgs, M.A., D. Sc., A.I.C.E. London and New York: E. & F. N. Spon. 1876. Crown 8vo., cloth, price 2s. 6d.

The directions to perform certain calculations by symbols are so plainly stated that he who runs (through the book) might read, were it not that a few literal errors,—two on page 12,—are interposed to prevent the pupil going too fast; for learners are apt to pass gaily over what is easy, without sufficiently retaining what is intended to be taught, whereby "the doubts of imperfect faith rather than the confidence of rational conviction" ensue. But in algebra thought and consideration are necessary in order to master the subject.

"We should bear in mind that the simple execution of analytical operations acquired by dint of practice and experience is a mere common species of labour, often merely mechanical; whilst a distinct apprehension of the specific object and meaning of the operations, and a contemplation of the clearness and beauty of the various arguments employed, constitute the intellectual lore that gratifies and enriches the mind, and stimulates its energies with an ardour after the investigation of truth."

The author shows in a most logical manner how desired results are attained, but proceeds in a way different from the usual one. He considers multiplication, involution, and exponents together, and the use of exponents as logarithms, proceeding to a definition of logarithms, and their common use; of compound multiplication and the binomial theorem; of divisions, fractions, and ratio; of continued proportion, of square and cube roots, and of equations, the mastery of which by the student will enable him to work out any technical formulæ he may wish.

Railway Appliances. By John Wolfe Barry, M. Inst. C.E. London: Longmans & Co. 1876.

This is one of Messrs. Longman's useful series of text-books of science. The "permanent way" of railways holds a kind of separate existence, and a middle position between the works of the line and the "appliances"; but the author includes, and thereby gives more interest to the book, the permanent way amongst the appliances, beginning with the formation-level, and describing generally the ballasting of the line, as well as the sleepers, chairs, and railways, with their spikes, trenails, fish-plates, bolts, and other fastenings. Since the Wigan accident the public have heard much about *facing-points*, and these are here described.

The public, or, as we are more inclined to think, a small section of the public—a few over-anxious persons—demand fast as well as frequent trains, and where the traffic is large, and there are but two running-lines of way, it is not easy to work the line without facing-points; but if these same over-anxious people knew the smallness of the difference between safety and danger in passing over facing-points they might be inclined to abate somewhat their urgent demands, and allow railway companies to conduct the traffic more leisurely. A railway engineer, of course, cannot allow that facing-points can be dispensed with, but the author urges the utmost precaution in the construction of the permanent way, and in the appliances belonging to it. "In the case of facing-points, any want of accuracy in adjustment is most serious, as by merely moving the points 2 in. one way or the other, the direction of a train can be altered, and if, of two lines connected by facing-points, one line be clear and the other be already occupied by trucks or carriages standing on it, an approaching train can be directed either to safety or to destruction by this small amount of motion. . . . . Every engineer avoids, as much as possible, inserting them on a main line. They cannot, however, be dispensed with altogether, as it would be impossible to conduct the present traffic of railways without them."

But there are other causes of liability to accident at facing points which are of less measurement than 2 in., and these concern the gauge of the rails, which, for safety, requires to be about ¼ in. narrower at points and crossings than at other parts of the line.

Of the rolling-stock of railways one hears, perhaps, more of wheels and axles than of other parts, and these are fully described and illustrated; but so, indeed, are all parts and all appliances, and notwithstanding the peculiarities of construction of railway appliances, this small volume will, we expect, be of general interest. Mr. Wolfe Barry has done his work very well.

Iron and Steel. By W. Mattieu Williams, F.C.S., F.R.A.S.

Copper Smelting. By J. Arthur Phillips, F.C.S., F.G.S., M. Inst. C.E.

Brass Founding, and Tinplate and Zinc Working. By Walter Graham.

These are practical little treatises, and form the first volume of a valuable series entitled "The British Manufacturing Industries," carefully edited by Mr. G. Phillips Bevan, F.G.S., and published by Mr. Stanford, of Charing-cross, price 3s. 6d. each volume.

There is much to be expected in the results of the diffusion of knowledge such as these volumes promise to convey; but as they will occupy important ground, it will be very necessary to their usefulness that the best information,—that is, such as is founded on principles of universal application,—shall be given, rather than such as is of merely local application and usefulness. To do this concisely, practically, yet generally, will entail upon the authors much study, time, and labour, however conversant each may be with his subject.

VARIORUM.

Nature (July 27th) has an account and view of the gigantic organ, comparatively little known, in the Hall, Primrose-hill, London. It was built by Messrs. Bryceson & Morten.——Messrs. G. W. Bacon & Co. have published a new map of the Isle of Wight, a careful reduction from the new 6-in. Ordnance Survey, being, we believe, the only map of the island published since that survey. Tourists will find it very satisfactory.——Messrs. Bemrose have added to their series of cheap "Panoramic Railway Guides," one to the "Great Western Railway," edited by R. Kemp Philp.——Mr. Charles Geoghegan, of Dublin, architect, is circulating a pamphlet, showing what has been, and what ought to be done in that city for the provision of artisans' dwellings. He says,—"An able professional writer, when alluding to the necessity of providing homes for the London poor, recently declared that as yet they had not been able to erect suitable tenements for working men at less than 150*l.* each dwelling, 43*l.* per room being the average outlay on each room in Cobden's Buildings, Bagnigge Wells, while our first attempt in Dublin has shown what can be effected at 80*l.* each dwelling of three apartments and sculleries; and for their suitability, comfort, extent, and appearance, a visit of inspection will amply satisfy the inquirer. We have yet before us a task demanding the Lamp of Aladdin to throw a wonderful light upon:—How to provide a good commodious room, replete with every requisite for the convenience and salubrity of the occupier, for the very poorest of the poor, at such cost as to return the investor a fair and reasonable interest for his capital. To accomplish this will be to extend the helping-hand to the outcast, and treat even him to the happiness of cleanliness and decency. That such may be done I am fully convinced, and the task shall not be abandoned until the case has been given over by the financial faculty as hopeless."

Miscellanea.

The Highfield Branch Free Library, Sheffield.—This building, which has been erected by the Corporation of Sheffield at a cost of 6,000*l.*, was opened on Tuesday last, the 1st inst. The building is substantially built. Over the entrance is some carving, together with a marble slab, on which is an appropriate quotation from Carlyle,—"That there should one man die ignorant who had capacity for knowledge, this I call a tragedy, where it happens more than twenty times in a minute, as by some computations it does." On either side of this slab is a carved stone female figure, one representing mechanical science and the other literature. These are by Mr. Cooper, of Cambridge and Sheffield. Inside everything is plain and useful. The entrance leads directly into the lending-room. The books, which number about 6,500 volumes, are arranged on shelves on the walls. The shelves even now appear to be well filled, but there is room still left to accommodate over 10,000 volumes.

The Ownership of Land.—A summary of the returns of owners of lands in England and Wales (exclusive of the metropolis), giving a classification according to the extent of their holdings, of the numbers of owners, together with a similar return for Scotland, has been laid upon the table of the House of Commons at the instance of Mr. Bright. From this it appears that in England and Wales, exclusive of the metropolis, there are 703,289 owners of less than one acre, the extent of their lands being 151,171 acres, and the gross estimated rental 29,127,679*l.*; above 1 and under 10 acres 121,983 owners, extent 478,679 acres, and gross estimated rental 6,438,324*l.*; above 10 and under 50 acres 72,640 owners, extent 1,750,079 acres, gross estimated rental 6,509,289*l.*; between 50 and 100 acres 25,839 owners, extent 1,791,605 acres, gross estimated rental 4,302,002*l.*; between 100 and 500 acres 32,317 owners, extent 6,827,346 acres, gross estimated rental 13,680,759*l.*; between 500 and 1,000 acres, 4,799 owners, extent 3,317,678 acres, gross estimated rental 6,427,552*l.*; between 1,000 and 2,000 acres, 2,719 owners, extent 3,799,307 acres, gross estimated rental 7,914,371*l.*; between 2,000 and 5,000 acres, 1,815 owners, extent 5,529,190 acres, gross estimated rental 9,579,311*l.*; between 5,000 and 10,000 acres 581 owners, extent 3,974,724 acres, gross estimated rental, 5,552,610*l.*; between 10,000 and 20,000 acres, 223 owners, extent 3,098,674 acres, gross estimated rental 4,337,023*l.*; between 20,000 and 50,000 acres, 66 owners, extent 1,917,076 acres, gross estimated rental, 2,331,302*l.*; between 50,000 and 100,000 acres, 3 owners, extent 194,938 acres, gross estimated rental 188,746*l.*; above 100,000 acres 1 owner, extent 181,616 acres, gross estimated rental, 161,874*l.* There were also returned 6,448 owners of acres not being specified, with gross estimated rentals amounting to 2,831,452*l.*; and 113 owners, with a total acreage of 1,423 acres, but without any rental being given.

The Timber Market as affected by Expense of Transit.—Mr. A. Peebles, prize essayist on agriculture, has an article in the *Timber Trades Journal* on "The Timber Trade in Hants and Berks," in which he says:—Many varieties of timber are annually sold by us at a sacrifice simply because they cannot be economically converted or utilised at home. This is much to be regretted, as it prevents us from realising full value for the produce of our woods and plantations, and limits trade and commerce in our midst. A few examples of how the value of timber is influenced by the locality in which it is grown will illustrate this point. Colliery timber grown in Ireland for consumption in England will realise more money than if grown in Hants or Berks. This is owing to the expense of transit from Dublin to Liverpool, or from Belfast to Maryport, being less than from the south of England to the midland or northern counties. In the vicinity of collieries prop wood of scotch or spruce firs sells readily at from 5*s.* to 7*s.* 6*d.* per 100 lineal feet. In this neighbourhood the same description of trees, averaging 12 ft. long would not exceed 30*s.* per 100 trees. Sycamore of large dimensions, used principally for printing blocks, will realise 4*s.* per foot within easy access of manufactories. In the south this valuable tree is seldom planted, either for ornament or profit. Soft woods, such as poplars and willows, used extensively for lining coal carts, trucks, and waggons, and for railway brakes, command 2*s.* per foot in Lancashire. With us it must be of superior quality to exceed the half of this sum. Alder and birch of various dimensions, used in the north for clog blocks or wooden soles for shoes, is in good demand at from 1*s.* 2*d.* to 1*s.* 6*d.* per foot. The same quality of timber in the south is not worth more than 8*d.* to 10*d.* per foot cube.

Burns and Scalds.—Dr. R. H. Allnatt writes,—"The late lamentable accident on board the *Thunderer* recals to my recollection a remedy for burns or scalds which was suggested to me some years ago by Lord Ebury. As an old medical man, and from personal observation, I can vouch for its efficacy, and in the absence of professional assistance the application may prove of inestimable value. The remedy is simply this,—The common whiting of commerce, reduced by cold water to the consistence of thick cream, is to be spread on light linen rag, and the whole burnt surface instantly covered, and thus excluded from the action of the air. The ease it affords is instantaneous, and it only requires to be kept moist by occasional sprinklings of cold water."

Assessment Case.—Lately, at the General Assessment Sessions, the following cross appeals were heard, namely,—the East and West India Dock Company (appellants), the Poplar Union Assessment Committee (respondents), and the Overseers of the Parishes of All Saints, Poplar, and Bromley St. Leonard's (appellants), the Poplar Union Assessment Committee (respondents). These were appeals under the provisions of the Metropolis Valuation Act. At the last quinquennial revision of the assessment lists, the overseers of the parishes, under the advice of their surveyors, placed the "gross value" of the property of the Dock Company at 172,388*l.*, and the annual "rateable value" at 116,840*l.* The Dock Company being dissatisfied with these figures, objected to them before the Assessment Committee, and contended that the rateable value should be altered to 54,000*l.* The Assessment Committee determined the sums at 106,154*l.* gross value, and 91,756*l.* rateable value. Against these figures both parties appealed to the Assessment Sessions, the Overseers of the parishes on the ground that they were too low, and the Dock Company because they considered them to be too high. When the matter was last before the Court it was stated that the investigation would involve a protracted inquiry into the accounts of the company, and that, as many surveyor witnesses would be called, it was arranged between the parties that the matter should be referred to Mr. Pownall, who now attended with his report, and stated that after several sittings, at which the Solicitor-General and other counsel appeared for the Dock Company, and the Hon. A. Thesiger, Q.C., and others for the parishes, and having taken very important evidence of eminent surveyors and others, he had decided to advise the Court to fix the gross value at 138,424*l.*, and the rateable value at 99,554*l.*, 12-13ths of which are in respect of the portion of the docks within the parish of Poplar, and 1-13th in respect of that portion within the parish of Bromley. These figures the Court adopted, and altered the assessment lists accordingly. The appeals have been the source of considerable interest. The surveyors advising the Dock Company were,—Mr. Vigers, Mr. C. Lee, Mr. Stephenson, and Mr. Clifton; whilst on the part of the parishes were—Mr. Morris, Mr. Harston, Mr. Marshall, Mr. Bracebridge, Mr. Hooper, and Mr. Castle.

Paper Mills and River Pollution.—According to evidence given in a case submitted to arbitration under the High Court of Justice, Exchequer Division, between Messrs. Wm. Drew & Co., of Keysham Mills, near Southampton, on the one part, and Mr. Carl Heinrich Roeckner, of the Royal Arcade, Newcastle-on-Tyne, on the other, it would appear that, so far at least as the paper manufacturer is concerned, waste liquors can not only be rendered innoxious, but that this can be done to the manufacturer's profit. Mr. Roeckner's claim against the defendants was, that as the patentee of a process for preventing the fouling of rivers by waste products from paper manufactures, he had supplied certain appliances to them, under an agreement entitling him to receive a stipulated percentage of profit upon their satisfactory use. This profit was obtained by recovering from the liquid in which Esparto grass, straw, or rag, was boiled for paper-making, the chemicals used in their conversion. Evidence was brought forward in which it was stated that at Messrs. Pirie's, the largest paper-mills in the country; at the Culter Paper Works, Aberdeen; and also at a well-known Irish mill, Mr. Roeckner's patent was in use with the most satisfactory results. The arbitrators came to the conclusion that Mr. Roeckner was entitled to the sum of 1,000*l.* in satisfaction of his claim.

Encouragement of Planting.—The law in New York State making provision for planting shade-trees along the highway is as follows:—"Any inhabitant liable to highway tax who shall transplant by the side of the public highway any forest shade-trees or fruit-trees of suitable size, shall be allowed by the overseers of highways, in abatement of his highway-tax, 1 dollar for every four trees set out; but no row of elms shall be placed nearer than 70 ft., no row of maples or other forest trees nearer than 50 ft., except locust, which may be set 20 ft. apart; fruit-trees must also be set at least 50 ft. apart, and no allowance as before mentioned shall be made unless such trees shall have been set out the year previous to the demand for said abatement of tax, and are living and well protected from animals at the time of such demand."

Proposed Canal between the English Channel and the Mediterranean.—The Paris *Temps* states that the improvements proposed in the scheme for a canal between the English Channel and the Mediterranean are likely soon to be adopted. The delegates of the Chambers of Commerce of Marseilles, Cette, Nîmes, Bordeaux, Avignon, Lyons, St. Etienne, Dijon, Rouen, Honfleur, Elbœuf, and other centres of industry have formed themselves into a Commission to promote its execution, and have had an interview with several members of the Government. The Minister of Finance asked for a sketch of the necessary works and the cost, and the Minister of Public Works acknowledged the advantage of a canal serving for vessels of 250 or 300 tons, adding that the financial question was the only thing to be considered. The Commission, adopting the estimate of State engineers, put the cost at 65,000,000f.—namely, 10,000,000f. outlay on the Lower Seine, 5,000,000f. on the Upper Seine and Yonne, 10,000,000f. on the Burgundy Canal, and 40,000,000f. on the Rhone. The depth would be 13·5 mètres on the Rhone, and 2 mètres elsewhere. Transshipment would in any case be necessary only at Lyons. The locks would be uniformly 133 mètres long and 12 broad on the canals. The works would be completed in six years.

Plant Impressions.—M. Bertot, of the Paris Academy, has just made known a simple method of taking impressions of plants, requiring only a large sheet of paper, some olive (or other) oil, blacklead, ashes, and resin (or colophony). The paper is first lightly oiled on one side, then folded in four, so that the oil may filter through the pores, and the plant may not come into direct contact with the liquid. The plant is placed between the leaves of the second folding, and in this position pressed (through other paper) all over with the hand, so as to make a small quantity of oil adhere to its surface. Then it is taken out and placed carefully on white paper; another sheet is placed above (since two impressions can be taken), and the plant is pressed as before. On now removing it an invisible image remains on the paper. You sprinkle over this a quantity of blacklead (or ashes, &c.), and distribute it in all directions, as in applying sand to writing; the image then appears in all its parts. With an assortment of colours the natural colours of plants may be reproduced. To obtain fixity, resin is added to the blacklead (previously) in equal quantity; the impression is fixed when it is exposed to a heat sufficient to melt the resin.

Artisans' Dwellings in the Midland Counties.—"The Midland Improved Dwellings Association" has been incorporated under the Companies Acts, 1862 and 1867, and proposes to issue, by instalments, 20,000 5*l.* shares. The Association has been formed for the purpose of providing more commodious and healthy dwellings, which are urgently needed, for the industrial and labouring classes in Derby, Nottingham, Leicester, Chesterfield, Burton-on-Trent, and other Midland towns. It is proposed to accomplish this by erecting blocks of buildings and cottages in situations where they are required, by building improved lodging-houses, and by the purchase or leasing of existing property to be adapted to the objects in view. The society intends to commence operations in Nottingham, and a plot of land in New Beck-street and Coal Pit-lane has already been purchased.

A Chimney-piece Found at Newbury.—Mr. Walter Money, who represents the British Archæological Association in Berkshire, has made public a list of antiquarian "finds" during the excavations for the new municipal buildings at Newbury. The most notable object is a chimney-piece of the fifteenth century, in Bath stone, found (in portions) 7 ft. or 8 ft. below the surface, the mantel or frieze being 7 ft. 6 in. by 15 in., and arranged in traceried panels, within six of which are a series of carved shields in relief (probably at one time emblazoned), one of which is ornamented with a Y or Tau cross, and on the adjoining panel is represented a square, enclosing on the sinister side two nails. This Mr. Money thinks may be intended for a rebus, frequently introduced in such work at that period. The original *locale* of this piece of masonry is at present in doubt.

Death of a Scottish Artist.—The *Scotsman* announces the death of Mr. R. T. Ross, R.S.A., an artist who has long been well known as a painter of cottage interiors and the out-door life of fishing villages.

Improvements at Chetham Library.—Considerable improvements have just been made at Chetham Library, Manchester, by Messrs. Clay & Son, builders, under the direction of Mr. Alfred Waterhouse, architect. One of the chief alterations effected is the acquirement of five large rooms on the ground-floor at the west side of the main building, which up to the time of the Reformation were occupied by the Roman Catholic priests resident in Manchester, and for whose use, in fact, the buildings had been specially erected. The premises afterwards passed into the hands of the Derby family, and were occupied by the wardens of the city. During the Civil War they were taken possession of by the Commonwealth, but were soon afterwards purchased by the executors of Sir Humphrey Chetham, and adapted in conformity with his educational scheme. The alterations, which have cost 1,000*l.*, will be finished in a few days.

Old Bricks.—Some interesting additions have been made to the Elamite antiques in the British Museum by Colonel Ross, our Political Resident at Bushire, on the Persian Gulf, and as soon as the fragments have been re-united, and catalogued, they will be exhibited to the public. The first portion of the collection consists of about thirty bricks of unbaked clay. Some of them are of a considerable size, and all, according to the almost uniform custom in the Euphrates and Tigris valleys in ancient times, as well as in that of the Nile, bear royal legends. One name impressed on these Elamite bricks, as upon many others found long ago on the same site, viz.,—Susa, the Elamite capital,—is Tar-kha-ak, who reigned about B.C. 700. Next to the bricks, among the objects transmitted by Colonel Ross, is a large vase made of sun-dried clay, containing human remains.

Colne Valley Water Company.—The works of the above Water Company, which have been carried out under the superintendence of Mr. J. F. Bateman, were formally opened on Thursday, the 3rd of August. One of the great features in the undertaking is the softening of the water by Dr. Clarke's process. The scheme is the first on a large scale that has been completed near London. The pumping station is situated in the Bushey Meadows, near Watford, and the water is drawn from the chalk at a depth of 235 ft. After being softened it is pumped up into a covered reservoir on Bushey Heath, the elevation of which, 518 ft. above ordnance datum, is such that the water can be supplied to the highest land between London and Watford by mere gravitation.

The Canal Population.—Mr. George Smith (Coalville) writes:—"I beg to inform you that I have this day received a copy of the following resolutions, passed on Friday in last week at a meeting of the Rugeley Ruridecanal Conference:—1. That to better the present miserable condition of the canal population, the Conference is of opinion—(1.) That women and children, except under stringent regulations, should be prohibited from living and working in the boats; (2nd.) That the Factory, Workshops, and Sanitary Acts should be extended to the boating population on the canals. 2. That Sunday traffic on the canals should be limited as far as possible. 3. That so long as the law does not prohibit children of school age living in canal boats, homes should be provided where such children can be boarded and educated."

The Working Classes in New York.—We learn by telegram from New York that 1,500 working men met in the park on Monday morning, and heard inflammatory denunciations of the city authorities. They then marched in a body to the City Hall, and demanded from the acting Mayor, the Public Works Commissioner, and the Controller, employment on the public works. The Mayor, Mr. Wickham, whom they held responsible for the reduction of wages, discountenances public improvements, and was purposely absent. The working men asserted that it was the duty of the Government to continue the public improvements, and provide employment for the starving working classes.

Proposed New Public Offices at Yarmouth.—A committee of the Yarmouth Town Council have resolved to recommend the Council to build a new public hall, court-house, and public offices upon the site of the present town-hall. The proposed site is undoubtedly the finest site in the town, and a local paper assumes that the Council will take care that the structure is one which shall be an ornament to the town, and worthy of the historic traditions of the old borough.

Proposed Testimonial to Mr. C. J. Palmer, F.S.A., of Great Yarmouth.—In the "Perlustration of Great Yarmouth" Mr. C. J. Palmer has made a valuable addition to his former contributions to literature and to the history of that important town. The completion of this work appears to many of his friends a fitting opportunity for expressing not only their personal feelings of esteem and regard, but for making some public recognition of the value of his services during the last fifty years, and a committee for this object has been formed.

Muchelney Abbey, Somerset.—We hear that interesting discoveries have been made here of late, the foundation of the north transept of the ancient Abbey Church having been unearthed. A fourteenth-century monument, some ornamental tiles of the same period, two skeletons, a large quantity of Early English, Decorated, and Perpendicular mouldings, bosses, and tracery were also discovered. The excavations are being conducted under the personal superintendence of Mr. Long, the lord of the manor.

Ludworth Village.—The *Darlington and Stockton Times* says that this village is in a most shocking unsanitary state. There are 227 colliery houses, independent of those belonging to tradesmen, without ashpits or drains; and many of the dwellings are greatly overcrowded. Taking each house to contain five inmates, there are no less than 1,200 people congregated in one spot, without any sanitary appliances at all. It was in this village that the cholera first broke out in Durham in 1848.

A Sanitary Authority and its Medical Officer.—The recent dismissal of Dr. Deville by the Harrogate Improvement Commissioners, for reading a paper before the Yorkshire Association of Medical Officers of Health having a special bearing upon watering-places, has been brought under the notice of the President of the Local Government Board, who has decided that the Sanitary Authority of Harrogate were not justified in giving notice to Dr. Deville of their intention to dismiss him.

Water-Waste Preventer. — Provisional specification lodged by J. G. Jennings, Lambeth, and A. W. Pocock, Westminster, describes a water-waste preventer, consisting of a cylinder with a loose piston working therein, and of valve apparatus for controlling the admission and escape of water, by which each time the handle of the closet is raised a volume of water equal to the contents of the cylinder is discharged into the pan, and when the handle has been put down another similar quantity of water is discharged.

Exhibition of Paintings at Peel Park, Salford.—An exhibition of paintings and other works of art was opened on the 28th ult., at the Royal Museum, Peel Park, Salford, by the Mayor of the borough (Ald. Richard Harwood). It is really a continuation of a series of exhibitions of a similar character, the last of which was held about seven years ago, and the Mayor by his influence has obtained the loan of 250 pictures, the value of which is put at 50,000*l*.

Sheffield Society of Artists.—At a general meeting of members, held on the 25th ult., the following were elected associate members:—W. D. Barker, Trefrin, North Wales; J. T. Cutts, H. S. Dale, Robert Hudson, sen., David Payne, J. C. Ragg, Jonathan Taylor, Wainman Topham, E. A. Harmington, and George Wright, all of Sheffield; W. M. Greaves, Leeds; and James Swanston, Bakewell.

The Mersey Tunnel Scheme.—A Liverpool paper states that the Mersey Tunnel scheme is not to be allowed to fall into the limbo of forgotten projects. A number of influential capitalists in London and Liverpool have determined to take it in hand, and they are not without good prospect of success.

A Testimonial.—Mr. J. F. Coles (foreman of carpenters to Messrs. Lucas Brothers, the contractors for the Royal Aquarium) has been presented by Mr. S. Coleman, managing director, on behalf of himself and other officers of the Society, with a gold chronometer "as a recognition of his unceasing labour at that institution."

New Bonded Stores at Swansea. — The foundation stone of some new bonded stores, about to be erected by Mr. Rees, builder, under contract, for Mr. George Bradford, wine and spirit merchant, was laid on the 27th ult. The stores, which will also comprise a suite of shops, are situate in Waterloo-street.

New Knights.—The dignity of knighthood has been conferred upon Mr. D. Macnee, president of the Royal Scottish Academy, and upon Mr. H. A. Hunt, Board of Works surveyor.

National Antiquarian Museum, Edinburgh.—The catalogue of antiquities in the National Museum of the Society of Antiquaries of Scotland has just been issued.

Industrial Exhibition in Denmark.—The King of Denmark on the 13th ult. opened an Industrial Exhibition at Aarhuus, the largest town in Jutland.

TENDERS

For alterations and repairs to No. 14, Bow-lane, City. Mr. Frederick C. Notley, architect:—

Mansfield & Son	£1,150 0 0
Hayworth	975 0 0
Newman & Mann	965 0 0
Greenwood & Sons	933 0 0

For the erection of a second pair of villa residences at Wandsworth-common. Mr. Frederick C. Notley, architect:—

Hayworth (accepted)	£1,830 0 0

For foundations for new offices at Steventon Manor, Hampshire, and enclosure walls, &c., to kitchen garden. Mr. R. Morrison Marnock, architect. Quantities by Mr. George Fleetwood:—

	Foundations.	Garden Walls.
Wilkes	—	2,498 0 0
Brass	1,299 0 0	2,122 0 0
Hale & Sons	1,045 0 0	1,960 0 0
Hill, Higgs, & Hill	1,087 0 0	1,930 0 0
Holland & Hannen	995 0 0	1,843 0 0
Bull & Son	1,013 0 0	1,749 0 0

For a pair of cottages at Steventon Manor, Hampshire. Mr. R. Morrison Marnock, architect:—

Wilkes (accepted)	£480 0 0

For repairs to St. Olave's Grammar School. Messrs. Snook & Stock, architects:—

Rider & Sons	£633 0 0
Pitman & Cuthbertson	579 0 0
Homan	570 0 0
Heeps	567 0 0
Brighton	565 0 0
Greenwood & Sons (accepted)	555 0 0

For a house at Thornton Heath, Croydon, for Mr. W. H. Sandy. Mr. Frederick West, architect:—

Hyde	£1,650 0 0
Mason & Bristy	1,371 13 0
Coles	1,369 0 0
Waller	1,250 0 0
Taylor	1,195 0 0
Marriage (accepted)	1,190 0 0

For making the proposed roads on the Greyhound Estate, Sydenham, under the superintendence of Messrs. Harvey & Davids, surveyors:—

Wootton	£986 0 0!
Cowdery & Sons	945 0 0
Woodham, Brothers	705 0 0
Wainwright	702 14 8
Porter	640 0 0
Hopkins	570 0 0
Taylor & Brown	536 0 0
Brevitor	513 0 0
Heath	470 0 0
Love	457 17 0
Lyons	435 0 0
Goodair	395 0 0!

For Wilberforce Memorial, St. Luke's Church, Camberwell. Mr. J. Edward K. Cutts, architect. Quantities by Mr. J. O. Abbott:—

	Church without Fittings.	Church with Fittings.
Brass	£7,627 0 0	£8,390 0 0
Manley & Rogers	7,585 0 0	8,283 0 0
Downs	7,527 0 0	8,237 0 0
Adamson & Son	7,468 0 0	8,2 8 0 0
Ennor	7,447 0 0	8,167 0 0
Lathey, Brothers	7,432 0 0	8,160 0 0
Stoner	7,239 0 0	7,777 0 0
Colls & Son	7,190 0 0	7,932 0 0

For erection of lunatic asylum for the borough of Nottingham for 288 patients. Mr. George J. Hine, architect. Quantities supplied:—

Fish & Son	£36,480 0 0
Oxley	35,920 0 0
Maw & Ingle	35,249 0 0
Hodson & Facon	35,000 0 0
Vickers	34,120 0 0
Marriott & Wartnaby	34,083 0 0
Stevenson	33,915 0 0
Bell & Son	33,762 0 0
Bradley & Barker	33,193 0 0
Ward	33,060 0 0
Harris (accepted)	32,000 0 0
Slim	31,121 0 0

For alterations, &c., at Normanhurst Court, Battle, for Mr. T. Brassey, M.P. Messrs. Cross & Wells, architects:—

Vidler	£2,450 0 0

For sanitary works at Normanhurst Court, for Mr. T. Brassey, M.P. Messrs. Cross & Wells, architects:—

Brown	£394 0 0

For alterations to Nos. 1 and 2, Paragon-buildings, Hastings, for Mr. Wellington Williams. Messrs. Cross & Wells, architects:—

Champion	£818 0 0
Ditch	800 0 0
Eldridge	756 0 0
Vidler	739 0 0
Geary & Brown	730 0 0

For detached residence, Holmesdale-gardens, Cornwallis Park Estate, Hastings, for Mr. G. A. Keyworth. Messrs. Cross & Wells, architects:—

Howell & Son	£1,859 0 0

For pulling down No. 131, Holborn, and re-erecting same, and making sundry additions and alterations to Ridler's Hotel, for Mr. Edward Ellis. Messrs. Farebrother, Ellis, Clark, & Co., architects. Quantities supplied by Messrs. R. L. Curtis & Sons:—

Scrivener & White	£2,104 0 0
Merritt & Ashby	2,050 0 0
Sharpington & Cole	1,987 0 0
Morter (accepted)	1,873 0 0

For new billiard-room, Putney, for Mr. W. B. Dick. Mr. D. Haylock, architect. Quantities by the architect.

Gibbs	£1,095 0 0
Avis	1,087 0 0
Adamson & Sons	969 0 0
Aries (accepted)	940 0 0
Pearce (withdrawn)	774 0 0

For new warehouse, Wapping, for Messrs. Middleton & Co. Mr. Charles Dunch, architect:—

Bayes, Brothers, & Allen	£1,387 0 0
Watts	1,385 0 0
Judd & Hawkings	1,345 0 0

For alterations to the Griffin Public House, St. Leonard-street, Shoreditch, for Mr. Naylor. Mr. Harris, architect:—

Thoms	£525 0 0
Judd & Hawkings	391 0 0

For farmhouse, South Leigh. Mr. William Eve, architect:—

Bartlett	£1,555 0 0
Claridge	1,535 0 0
Orchard	1,497 0 0
Dover	1,390 0 0
Wilkins	1,385 0 0

For cottages, South Leigh. Mr. William Eve, architect:—

Bartlett	£640 0 0
Claridge	605 0 0
Orchard	530 0 0
Dover	490 0 0

For residence, Theydon Bois. Mr. William Eve, architect:—

Sheffield	£1,402 0 0
Salt	1,449 0 0
Herser	1,300 0 0
Hammond	1,085 0 0
Clarke (accepted)	1,000 0 0

For constructing the Ilsham, and four small sections of St. Marychurch, Devon, main drainage scheme. Messrs. Tarring, Son, & R. L. Wilkinson, surveyors:—

Shaddock	£8,500 0 0
Matthews	5,233 0 0
Wilcox (accepted)	4,775 0 0

For works in painting and decorating Hemingford House, Hunts, for Mr. Bateman Brown, J.P. Messrs. J. Tarring & Son, architects:—

Phillips & Son*	£335 15 7

* Exclusive of men's travelling expenses and lodgings.

For new wing, &c., to Dale Park Estate, Sussex, for Mr. J. Fletcher:—

Webb	£3,271 12 0!
Beach, Brothers	3,063 0 0
Dover & Co.	2,850 0 0
Horn	2,623 0 0
Bysh	2,579 0 0
Stephenson	2,397 0 0
Coles	2,332 0 0
Hayter	2,213 0 0
Allen	2,188 0 0
Longley	2,178 0 0
Wells	2,022 0 0
Reynolds	2,011 0 0
Gibson	1,981 0 0!

£13 added to each for plumber's work.

For alterations and additions to the Convent, Roselands, Upper Walmer, for Monseigneur Danlewskie. Messrs. C. W. & P. Pugin, architects:—

Demie (accepted)	£2,150 0 0

For new presbytery, Sheerness, for the R. C. Bishop of Southwark. Messrs. C. W. & P. Pugin, architects. Quantities by Mr. R. O. Harris:—

Geere & Guly (accepted)	£1,006 0 0

For new schools at Lower Bullingham, Herefordshire, for the Superioress of the Convent. Messrs. C. W. & P. Pugin, architects:—

Welsh (accepted)	£700 0 0

For new chancel to Our Lady's Catholic Church, Birkenhead, for the Rev. Edward Slaughter. Messrs. C. W. & P. Pugin, architects. Quantities by Mr. R. O. Harris:—

Woolley (accepted)	£1,600 0 0

For new chancel and sacristies to the R. C. Church, Widnes, for the Rev. James Clarke. Messrs. C. W. & P. Pugin, architects. Quantities by Mr. R. O. Harris:—

Middlehurst (accepted)	£1,393 0 0

For new presbytery at Bootle, for the Rev. Edward Powell. Messrs. C. W. & P. Pugin, architects:—

Hughes (accepted)	£2,300 0 0

For new skating-rink at Ramsgate, for Mr. W. G. Owen. Messrs. C. W. & P. Pugin, architects:—
Accepted tenders, £700.

For the erection of a lodge at the Metropolitan Convalescent Institution's Home, Norbiton. Mr. H. Saxon Snell, architect:—

Ranford	£375 0 0
Wall, Brothers	374 0 0
Howard	365 0 0
Morris (accepted)	332 10 0